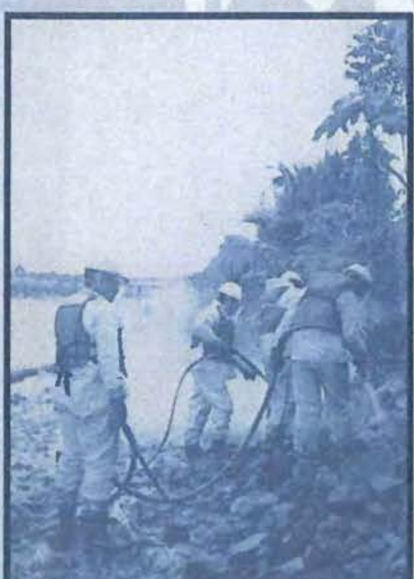
SFUND RECORDS CTR
2212848

9282-2212848

CLEANUP PLAN AND ANALYSIS OF BROWNFIELD CLEANUP ALTERNATIVES
4060-4062 HOLLIS STREET
EMERYVILLE, CALIFORNIA



Geotechnical

and

Environmental

Sciences

Consultants

Ninyo & Moore

9282-2212848

FINAL SITE CLEANUP PLAN AND ANALYSIS OF BROWNFIELD CLEANUP ALTERNATIVES
4060-4062 HOLLIS STREET
EMERYVILLE, CALIFORNIA

PREPARED FOR:
City of Emeryville Redevelopment Agency
1333 Park Avenue
Emeryville, California 94608-3517

PREPARED BY:
Ninyo & Moore
Geotechnical and Environmental Sciences Consultants
1956 Webster Street, Suite 400
Oakland, California 94612

November 26, 2008
Project No. 401134004

November 26, 2008
Project No. 401134004

Mr. Ignacio Dayrit
Redevelopment Agency of the City of Emeryville
1333 Park Avenue
Emeryville, California 94608

Subject: Final Site Cleanup Plan and Analysis of Brownfield Cleanup Alternatives
4060-4062 Hollis Street
Emeryville, California.

Dear Mr. Dayrit:

At your request, we have prepared this Site Cleanup Plan (SCP) and Analysis of Brownfield Cleanup Alternatives (ABCA) report for the City of Emeryville property located at 4060-4062 Hollis Street in Emeryville, California (site). The purposes of this SCP and ABCA are to evaluate several remediation options and to recommend the selection of the most viable option for the site.

We appreciate the opportunity to be of service to the City of Emeryville on this project.

Sincerely,
NINYO & MOORE

Professional Geologist
Kristopher M. Larson
No. 8059
State of California

D. Blair Bridges
Senior Staff Environmental Geologist

Kris M. Larson, P.G.
Senior Environmental Geologist

DBB/KML/csj

Distribution: (1) Addressee
(1) Mike Biddle, Emeryville
(1) Diane Strassmaier, United States Environmental Protection Agency
(1) Donna Drogos, Alameda County
(1) Mary Rose Casa, RWQCB
(1) Barbara Cook, DTSC
(1) Lynn Nakashima, DTSC
(1) Janet Naito, DTSC
(1) Elizabeth Allen, RWQCB
(1) Susan Colman

TABLE OF CONTENTS

Tables

Figures

Appendices

1. INTRODUCTION

On behalf of the City of Emeryville Redevelopment Agency, Ninyo & Moore has completed this Site Cleanup Plan (SCP) and Analysis of Brownfield Cleanup Alternatives (ABCA) for the non-time-critical removal action at the site located at 4060–4062 Hollis Street in Emeryville, California (Figure 1). This non-time-critical removal action will be funded partially under a United States Environmental Protection Agency (EPA) cleanup grant and by the City of Emeryville (the City). The City is acting as the Lead Agency under a Memorandum of Understanding with the California Department of Toxic Substances Control (DTSC) and the Regional Water Quality Control Board (RWQCB), San Francisco Region. Both Agencies reviewed the draft SCP and provided comments in August and September, 2008. Our responses to Agency comments have been incorporated into this SCP, and the City is seeking Agency concurrence with the responses pending final review. Susan G. Colman is acting as the Brownfields Site Manager who will provide regulatory and technical support on the loan to the City, and the Emeryville Redevelopment Agency will administer the cleanup grant. Brownfields legislation restricts eligibility for Brownfields funding to petroleum contaminated sites that are relatively low risk, where no viable responsible party is available, and Resource Conservation and Recovery Act (RCRA) corrective actions have not been ordered. Funding for site cleanup and future redevelopment is being partially provided under the Brownfields cleanup program.

This report first describes the objectives of the SCP and ABCA. It then discusses the site in terms of geographic setting, history of operational development/use, physical site characteristics, and previous site actions. This is followed by a description of the nature, source, and extent of use-related environmental impact at the site. This report then provides an assessment of the significance of contamination in relation to human and ecologic site populations, followed by an ABCA and a recommendation for removal action. This is followed by a discussion of public participation and regulatory requirements. Finally, the implementation of the removal action plan is discussed.

1.1. Site Cleanup Plan and ABCA Objectives

The objectives of this SCP and ABCA are to define the nature and extent of site contamination, identify removal action objectives to mitigate site contamination, develop and analyze alternatives to satisfy the objectives (based on effectiveness, implementability, and cost), and provide a recommendation for the most appropriate course of removal action. Information used in preparation of this SCP and ABCA was obtained during the Phase I Environmental Site Assessment (ESA), Phase II ESA, and the Additional Site Investigation (ASI) conducted by Ninyo & Moore in 2005, 2006, and 2007 respectively.

2. SITE BACKGROUND

This section provides the site description, previous uses, the topography, geology, hydrogeology, and meteorology of the site, the surrounding land use, and previous site investigations.

2.1. Site Location and Description

The site is located at 4060-4062 Hollis Street in Emeryville, Alameda County, California. The site geographic coordinates are approximately W122.285270 degrees longitude and N37.830541 degrees latitude. The property is rectangular-shaped, covering an approximate 33,800-square-foot area (Figure 2). The site contains one structure, an approximate 30,100-square-foot vacant warehouse, which covers most of the site. A small section of the southern portion of the site is open space that is sparsely vegetated, with several trees bordering the site adjacent to 40th Street, and a paved parking lot is located on the northwestern portion of the site. Sidewalks that are not part of the property boundary border the site to the east and south. The site is bound to the north by the City of Emeryville City Hall; to the south by 40th Street, across from which is an apartment complex; to the east by an asphalt parking lot; and to the west by Hollis Street, across from which is a commercial building.

2.1.1. Site Name and Address

The site was formerly occupied by the United Stamping Company, however, because United Stamping has since sold the property to the City of Emeryville, the site will be referred to in this SCP and ABCA by the site address (4060-4062 Hollis Street).

2.1.2. Contact Person, Mailing Address, and Telephone Number

The contact person for the site is Mr. Ignacio Dayrit of the Redevelopment Agency of the City of Emeryville. Mr. Dayrit's address is 1333 Park Avenue, Emeryville, California 94608, and his telephone number is (510) 596-4356.

2.1.3. EPA Identification Number

A temporary EPA identification number for the site will be obtained when a schedule for excavation activities is finalized.

2.1.4. Assessor's Parcel Number and Map

The Assessor's Parcel Number obtained for 4062 Hollis Street, Emeryville, from the Alameda County Assessor's Office website is 49-618-4.

2.1.5. Ownership

The property is owned by the City of Emeryville.

2.1.6. Proposed Redevelopment

A community arts center is proposed as the future site use of the warehouse, and a landscaped area is proposed south of the warehouse in the former railroad spur area.

2.2. Operational History and Status

Based on our review of historical sources, it appears that the site was developed prior to 1903 as residential property. A railroad track and spur was observed along the southern boundary of the site on a 1911 Sanborn Map, and according to historical aerial photographs reviewed the railroad spur was removed some time between 1982 and 1993. No additional information was revealed during the review regarding the removal of the railroad spur or the importation of any soil or backfill material to the site. A warehouse/office building was constructed on site to house a screw manufacturer as early as 1946. A screw machine products manufacturer occupied the site address listed as 4060-4062 Hollis Street between 1944 and 1963 when the building occupants at 4060 Hollis Street became a metal fabrication and stamping facility. The stamp manufacturing operation terminated in 2006 when the City of Emeryville bought the site. From at least 1964 until after 1986, 4062 Hollis Street was listed in Emeryville city directories as Acorn Paper Company and was located in the northeast corner of the site. Permits were the only historical information found associated with this facility. The permits were issued in 1973 (No. B760) and 1976 (No B1306) to Acorn Paper to recoat the roof with asbestos roof coatings for 4062 Hollis Street. No information was reviewed indicating details of the operations carried out by the Acorn Paper Company. A telephone call was made to the Acorn Paper Company who informed Ninyo & Moore that they did not own and had not owned a business in Emeryville. The site warehouse is currently vacant.

2.3. Topography

Based on a review of the United States Geological Survey, Oakland West Quadrangle, 7.5 minute quadrangle map (1993), the site is at an elevation of approximately 20 feet above mean sea level (MSL) and the topography in the vicinity of the site gently slopes toward the west.

2.4. Geology and Hydrogeology

2.4.1. Site Geology and Soil Types

The site is located within the Coast Range Geologic Province (California Geologic Survey [CGS], 2003). The San Francisco Bay and Bay margin geology was formed by a series of Mesozoic and Cenozoic aged oceanic crust and volcanic arc terrains accreted to the continent. Uplift also occurred along the Hayward Fault Zone during the Cenozoic. Bedrock geologic units within the site area include Jurassic Coast Range Ophiolite, Late Jurassic-Early Cretaceous Franciscan Complex and Knoxville Formation, and the Late Cretaceous Great Valley Sequence. Late Quaternary deposits consisting of Pleistocene to Holocene alluvial fan deposits overlie the bedrock formations within the site area.

Soil characteristics were observed from soil samples collected during the subsurface investigations conducted by Ninyo & Moore in January 2006 (Ninyo & Moore, 2006) and December 2007 (Ninyo & Moore, 2008). Site fill beneath the concrete slab of the warehouse consisted of sandy gravel from ½ foot to 2 feet below ground surface (bgs). Gravels encountered were sub angular and approximately ½ inch in diameter. Site fill in the former railroad spur area, in the southern portion of the site, consisted of gravelly sands and silts with sub angular gravels to 1 inch in diameter. This material was underlain by moist, silty clay and sandy clay to 20 feet bgs in the warehouse area and to 4 feet bgs in the former railroad spur area.

2.4.2. Site Hydrogeologic Setting

The site is located in the East Bay Plain Subbasin aquifer system (EBP), which is a northwest-trending alluvial plain bounded by San Pablo Bay (north), Franciscan Bedrock (east), and the Niles Cone Groundwater Basin (south). The San Francisco Bay overlies the EBP to the west. The EBP is composed of approximately 1,000 feet of Quaternary aged unconsolidated sediments. The Quaternary deposits include the early Pleistocene Santa Clara Formation (300 to 600 feet of alluvial fan deposits, including lake, swamp and river channel sediments), late Pleistocene Alameda Formation (26 to 245-foot-thick deposits of mud and alluvial fan sediments), early Holocene Temescal Formation (layered deposits of silt, clay, and gravel up to 50 feet thick), and artificial fill. The EBP has existing and potential beneficial uses for municipal water supply, industrial process and service water supply, and agricultural water supply.

No natural surface water bodies, including ponds, streams, or other water bodies, are present on the site. The nearest surface water body to the site is Temescal Creek, located approximately 1,800-feet north of and crossgradient to the site, trending in an east-west direction. The San Francisco Bay is located approximately one-half of a mile west of and downgradient from the site. Ninyo & Moore's Phase II ESA and ASI reported that groundwater was encountered between 13 and 17 feet bgs in seven site borings

(Ninyo & Moore, 2006; Ninyo & Moore, 2008a). Groundwater was first observed in native sandy clay underlying the site and likely has a westerly gradient, toward the bay.

2.5. Surrounding Land Use and Sensitive Ecosystems

Land surrounding the site is used for commercial and residential purposes. There are no sensitive ecosystems known to Ninyo & Moore in the vicinity of the site.

2.6. Meteorology

The climate in the Emeryville area is classified as Mediterranean. The table below summarizes average temperatures and precipitation amounts on a monthly basis. These statistics are based on nearly 30 years of recorded data.

Table 1 – Average Monthly Temperatures and Precipitation for Emeryville

Month	Average Maximum Temperature (°F)	Average Minimum Temperature (°F)	Average Mean Temperature (°F)	Average Mean Precipitation (inches)
January	57.2	44.4	50.8	4.78
February	61.6	47.9	54.8	4.19
March	63.3	49.1	56.2	3.60
April	66.5	50.5	58.5	1.36
May	69.0	53.5	61.2	0.56
June	71.7	55.7	63.7	0.12
July	72.6	57.0	64.8	0.07
August	73.6	58.3	66.0	0.10
September	74.6	58.3	66.5	0.32
October	72.0	55.3	63.6	1.31
November	63.9	49.6	56.8	3.45
December	57.4	44.5	51.0	3.33

Notes:
°F – degrees Fahrenheit
Source: Western Regional Climate Center, Oakland Museum, 1970 to 1999

2.7. Previous Site Actions

A Phase I ESA was conducted by Ninyo & Moore in July 2005 (Ninyo & Moore 2005a), a Hazardous Building Materials Survey was conducted by Ninyo & Moore in August 2005 (Ninyo & Moore, 2005b), a Limited Phase II ESA was conducted by Ninyo & Moore in January 2006 (Ninyo & Moore, 2006), and an ASI was conducted by Ninyo & Moore in May 2008 (Ninyo & Moore, 2008a). Samples were collected throughout the site to account for uncertainties due to unknown historical operations. Soil and groundwater samples were analyzed for total extractable hydrocarbons (TEHs), volatile organic compounds (VOCs), polynuclear aromatic hydrocarbons (PAHs), and California Code of Regulations Title 22 bioaccumulative and persistent metals (metals) and soil vapor samples were analyzed for VOCs.

3. NATURE, SOURCE, EXTENT, AND HEALTH EFFECTS OF CONTAMINANTS

The character, extent, and health effects of contaminants discovered during previous site investigations are discussed in this section.

3.1. Nature, Source, and Extent of Contaminants

The nature, source, and extent of contaminants in the subsurface are discussed below for soil, groundwater, and soil vapor. Laboratory analytical results for soil, groundwater, and soil vapor samples collected during both subsurface investigations are summarized in Tables 3 through 11. Figures 2 and 4 illustrate constituents of concern (COCs) reported in soil samples.

3.1.1. Soil

Concentrations of COCs in soil are discussed below, along with screening level comparisons. Screening levels used for comparison included the RWQCB's direct exposure ESLs obtained from Tables K-1 (residential scenario) and K-2 (commercial/industrial scenario), using a hazard index of 1 for non-carcinogens (RWQCB, 2008).

In addition, the data were also compared to soil leaching screening levels for drinking water and non-drinking water from Table G, when available. The screening levels are shown in Tables 3 through 6. The tables delineate soil samples collected in the warehouse from those collected in the former railroad spur area, along with their reported concentrations.

3.1.1.1. Warehouse Interior

Analytical results from the 2006 and 2007 investigations indicated that concentrations of metals, PAHs, and VOCs detected in soil were below screening levels (Tables 4 through 6). Only one sample contained TEH compounds at concentrations exceeding the ESL for a residential exposure, but did not exceed the ESL for commercial exposure (Table 3). The soil sample was collected in 2006 from 2 feet beneath the concrete slab in boring B5 in the western section of the warehouse. The lateral and vertical extent of TEH in soil at this location was further defined in December 2007 by analytical results from the three B5 step-out borings, (B5A, B5B, and B5C), which indicated that the TEH was localized laterally in the immediate vicinity of B5 (Figure 2). In addition, the TEH was limited to the top few feet of soil, as demonstrated by the relatively low concentrations reported in the sample collected at 5 feet bgs in B5.

3.1.1.2. Former Railroad Spur Area

The analytical results from the Limited Phase II ESA and ASI indicated that the soil in the former railroad spur area has been impacted with concentrations of TPHd, benzo(a)pyrene, arsenic, cadmium, chromium, lead, and vanadium above screening levels (Figure 4). As seen on Tables 3 through 5, concentrations of COCs decrease significantly with depth indicating limited migration. The potential sources for COCs with concentrations above ESLs are the lubricants, wood treatments, and pesticides used to maintain the former track and train associated with the former railroad spur that ran through the southern portion of the site.

3.1.2. Groundwater

TEHs, PAHs, VOCs, and metals were reported in groundwater samples collected on site (Tables 7 through 10). Screening criteria for concentrations of constituents in groundwater included: taste and odor threshold ESLs for drinking water (ESL Table I-1), nuisance odor threshold ESLs for non-drinking water (ESL Table I-2), drinking water toxicity ESLs (ESL Table F-3), solubility limits ESLs (ESL Tables I-1 and I-2), groundwater screening levels for drinking water (Table F-1a), and groundwater screening levels for evaluation of potential vapor intrusion concerns for VOCs (ESL Table E-1). The screening criteria are included in Tables 7 through 10.

The highest concentrations in groundwater of TPHd (490 micrograms per liter [μg/l]), TPHmo (400 μg/l), and TPHhf (880 μg/l) were significantly below the solubility value of 2,500 μg/l and the nuisance odor threshold of 5,000 μg/l for non-drinking water (ESL Table I-2), but the highest concentrations were slightly above the taste and odor threshold of 100 μg/l (ESL Table I-1) and toxicity value of 210 μg/l (ESL Table F-3) for drinking water.

A few metals were detected in groundwater, including barium, chromium, nickel, vanadium, and zinc (Table 8). The concentrations were all below the ceiling level ESLs for drinking water and non-drinking water (ESL Tables I-1 and I-2). In addition, the concentrations were below the groundwater screening levels based on drinking water toxicity of 1,000 μg/l barium, 50 μg/l total chromium, 100 μg/l nickel, 15 μg/l vanadium, and 5,000 μg/l zinc (ESL Table F-3).

For PAHs, the ESLs were not shown in Table 9 because only one compound, naphthalene, was detected in one sample at 0.1 μg/l, which is significantly below the taste and odor ESL of 21 μg/l for drinking water (ESL Table I-1), the final screening level of 17 μg/l for drinking water (Table F-3), and the ESL for the evaluation of vapor intrusion of 11,000 μg/l for commercial use and of 3,200 μg/l for residential use (ESL Table E-1).

Several VOCs were reported in groundwater samples (Table 10); however, none were reported above Groundwater ESLs for Evaluation of Potential Vapor Intrusion Concerns (ESL Table E-1). The low VOC concentrations are similar to the concentrations reported throughout Emeryville.

3.1.3. Soil Vapor

Soil vapor analytical results from the ASI (Table 11) indicated that concentrations of VOCs detected in soil vapor were below Shallow Soil Gas ESLs for Evaluation of Potential Vapor Intrusion Concerns using DTSC Attenuation Factors, obtained from Table E-4 of the RWQCB's ESLs.

3.2. Health Effect of Contaminants

Soil on site has been impacted with TEH compounds, benzo(a)pyrene, arsenic, cadmium, chromium, lead, and vanadium.

TEH compounds are a mixture of chemicals, including most diesels, lubricating oils, greases, waxes, and hydraulic oils, as well as other petroleum products. TEH compounds can affect the blood, immune system, lungs, skin, eyes, central nervous system, liver, and kidneys negatively and can cause headaches, dizziness, and numbness in the feet and legs.

ESLs were developed to address environmental protection goals, including the protection of human health from direct exposure to contaminated soil. TEH compounds were reported above ESLs in boring B13 in the former railroad spur area.

Benzo(a)pyrene is a PAH. PAHs are used in a variety of industrial products. The only PAH detected on site above ESLs was benzo(a)pyrene in boring B15 in the former railroad spur area. The International Agency for Research on Cancer has indicated that benzo(a)pyrene is probably carcinogenic to humans.

Lead is a toxic heavy metal and a suspected carcinogen that may be encountered in inorganic or organic forms. Total lead was reported above ESLs in borings B13A and B15 in the former railroad spur area.

Arsenic is a toxic heavy metal and a carcinogen that may be encountered in inorganic or organic forms. Arsenic was reported above ESLs in every boring; however, arsenic is a naturally occurring metal in soil and was reported above the screening level only in boring B15.

Cadmium is a toxic heavy metal that may be encountered in inorganic or organic forms. Cadmium has been designated a human carcinogen by the International Agency for Research on Cancer.

Hexavalent chromium is a known carcinogen. Total chromium was reported above ESLs in borings B13A and B15 in the former railroad spur area. Chromium was not speciated, so the concentration of hexavalent chromium in the soil on site is unknown.

Vanadium may be encountered in inorganic or organic forms. Vanadium was reported above ESLs in boring B15 in the former railroad spur area.

3.3. Receptors Potentially Affected by the Site

Human receptors could potentially be affected by the site. Human receptors would include landscapers, gardeners, utility workers, and/or employees. Given the potential future use of the property as a community arts center, residential populations would not be included as a potential receptor.

4. RISK EVALUATION AND PRELIMINARY CLEANUP GOALS

4.1. Risk Evaluation

Prior investigations identified concentrations of contaminants above the screening levels. This section evaluates risks posed by those contaminants to human health and the ecological environment at the site.

4.1.1. Human Health Screening Risk Evaluation

Human health could be affected by potential on site COCs through several pathways, including inhalation, ingestion, and dermal contact. Human receptors can be exposed to airborne COCs in the form of vapors, volatilization of COCs from soil, and releases from contaminated particulate dust (inhalation and ingestion). Exposures are most likely to occur during excavation activities or when landscapers, gardeners, and/or utility workers are working at the proposed landscaped area of the site (the former railroad spur area). Exposure to groundwater is not expected during soil remediation because only a few feet of soil will be remediated, or during future utility construction or repair work because groundwater is between 13 and 17 feet bgs. In addition, groundwater beneath the site will not be used because the City of Emeryville's city-wide ordinance (06-007) prohibits the use of groundwater for residential, commercial, or industrial purposes. Exposure to COC-impacted soil beneath the building slab is not anticipated because the City indicated that the slab will remain in place during building refurbishment. However, if the building slab is removed in the future, soil beneath the slab will be re-evaluated at that time. Therefore, the risk evaluation and remediation efforts are related to contaminated soil in the former railroad spur area.

4.1.2. Environmental Screening Risk Evaluation

The site contains no ecological components that are considered to be at risk at this time. Additionally, because the site is located one-third of a mile from Temescal Creek and one-half of a mile from the San Francisco Bay, the nearest surface water bodies, and because the impacts to groundwater detected at the site are not of a magnitude likely to migrate over these distances, the risk of potential impact to surface water bodies is negligible. Therefore, aquatic habitat goals are not evaluated.

4.2. Removal Action Objective and Recommended Cleanup Goals

The objective of this Non-Time Critical Removal Action is to reduce the concentration of TPHd, benzo(a)pyrene, and metals (arsenic, cadmium, chromium, lead, and vanadium) in soil to below their respective recommended cleanup goals in an effective and expedient manner to prevent exposure to site users and future construction workers. Cleanup goals are proposed to protect site users, landscapers, and construction workers from health risks associated with potential exposures to COC-impacted soils during construction and future use of this facility.

Cleanup goals for each of the site COCs are listed in Table 2 and discussed below.

Table 2 –Recommended Cleanup Goals for Constituents of Concern

Constituent of Concern	Recommended Cleanup Goal
TPHd	2,200 mg/kg[1]
Benzo(a)pyrene	0.13 mg/kg[1]
Arsenic	24 mg/kg[2]
Cadmium	7.4 mg/kg[1]
Chromium	210 mg/kg[2]
Lead	370 mg/kg[2]
Vanadium	1,000 mg/kg[1]

Notes:
TPHd – Total Petroleum Hydrocarbons as diesel
mg/kg – milligrams per kilogram
[1]San Francisco Bay RWQCB Direct Exposure Soil Screening Levels, Commercial/Industrial Worker Exposure Scenario (Table K-2).
[2]Cleanup goal approved for other Emeryville sites for multi-family and park uses.

Cleanup levels for soil were established for a commercial scenario for the former railroad spur area because it will be developed into a landscaped area in front of the community arts center.

Although the cleanup goal for TPHd is the commercial/industrial direct exposure ESL, it is protective of future site users because concentrations of TPHd remaining after soil excavation will be below the direct exposure ESL for residential exposure. The TPHd cleanup goal is protective of groundwater quality because after soil excavation, only two shallow samples (190 mg/kg at 1 foot bgs in B14 and 310 mg/kg at 1 foot bgs in B16) will contain TPHd concentrations slightly above the soil leaching screening level of 180 mg/kg for non-drinking water and only one deeper sample (86 mg/kg in B16 at 4 feet) will contain a TPHd concentration slightly above the soil leaching screening level of 83 mg/kg for drinking water (Table 3). However, according to the RWQCB's Bay Area Region Screening For Environmental Concerns at Sites With Contaminated Soil and Groundwater document (RWQCB, 2008), the soil leaching screening levels were calculated for vadose-zone soil "conservatively assumed to be very permeable sand that freely allows the migration of leachate to groundwater". Soil at the former railroad spur area was observed to be fine sandy clay between approximately 1.5 feet and at least 4.5 feet bgs. Therefore, this soil type would be a greater inhibiter of the migration of leachate to groundwater than very permeable sand and thus be more protective of groundwater quality.

Cleanup goals were not established for TPHmo and TPHhf because their concentrations did not exceed the commercial direct exposure ESL (Table 3). However, the soil containing the highest TPHmo and TPHhf concentrations (B13 and B15) will also be removed to meet the TPHd cleanup goal. As a result of the soil excavation, the highest concentrations of TPHmo and TPHhf that will remain in place will be below the residential direct exposure ESLs (Table 3). There are no soil leaching ESLs for TPHmo and TPHhf because they are not soluble.

The cleanup goal for benzo(a)pyrene is protective of future site users because after soil excavation, only one sample will contain a benzo(a)pyrene concentration slightly above the residential direct exposure ESL of 0.038 mg/kg (0.042 mg/kg in B14) (Table 5). However, the 95% upper confidence limit (UCL) concentration is 0.014 mg/kg for benzo(a)pyrene, which is below the residential direct exposure ESL. A discussion of the statistical analysis and spreadsheets used to calculate the UCL is presented in Appendix C. The cleanup goal is also protective of groundwater because all of the concentrations that will remain in place after soil excavation are significantly below the soil leaching screening level of 130 mg/kg (ESL Table G).

Although arsenic is naturally occurring in soil, the naturally-occurring concentrations often exceed risk-based screening levels. After soil excavation, the highest arsenic concentration remaining will be 15 mg/kg, and the center of the site where the remediation will occur will be replaced with clean soil imported to backfill the excavation. Future site users will include people walking by the landscaped area into the community arts center, maintenance workers, landscapers, and subsurface utility workers.

The cleanup goal approved by the DTSC and the RWQCB for former Union Pacific Railroad (UPRR) parcels 1, 2, 3, 4, 4a, 6, 7, 8, and D was 24 mg/kg; these parcels were developed for park use, where exposure scenarios included recreational, walkway/greenway, sitting benches, and tot lots. The cleanup goal is protective of future site users because the potential for exposure is expected to be substantially less than assumed for the recreational land uses at the other parcels for all potential receptors. There is no soil leaching screening level for arsenic and arsenic was not detected in grab groundwater samples.

The cleanup goal for cadmium is protective of future site users because after soil excavation, the highest concentration remaining will be 1.1 mg/kg, which is below the residential direct exposure ESL of 1.7 mg/kg (Table 4). There is no soil leaching screening level for cadmium; however, cadmium was not detected in grab groundwater samples.

Total chromium is also naturally occurring and there is no direct exposure ESL for total chromium. The cleanup goal is 210 mg/kg, which was the cleanup goal approved by DTSC and the RWQCB for former UPRR parcels for a park use scenario and for the Pinnacles site, a multi-family residential development. This cleanup goal is appropriate for the landscaped area in front of the community arts center because it will have a similar exposure scenario as a park and landscaped areas at a multi-family residential development. There is no soil leaching screening level for chromium; however, chromium was reported in only one groundwater sample at a concentration below the groundwater screening level for drinking water toxicity.

The cleanup goal for lead is 370 mg/kg, which was the cleanup goal approved by DTSC and the RWQCB for a park use scenario at the former Dutro site. This cleanup goal is appropriate for the landscaped area in front of the community arts center because it will have a similar exposure scenario as a park. The cleanup goal will be protective of future site users because concentrations remaining in soil after soil excavation will be below the direct exposure ESL for a residential scenario of 260 mg/kg, except in only one sample (300 mg/kg in B14) (Table 4). However, the 95% UCL concentration is 119.3 mg/kg for lead, which is below the residential direct exposure ESL. A discussion of the statistical analysis and spreadsheets used to calculate the UCL is presented in Appendix C. There is no soil leaching screening level for lead; however, lead was not detected in groundwater samples.

The cleanup goal for vanadium is protective of future site users because after soil excavation, all concentrations remaining are below the residential direct exposure ESL (Table 4). There is no soil leaching screening level for vanadium; however, vanadium was reported in only one groundwater sample at a concentration below the groundwater screening level for drinking water toxicity.

As discussed in Section 3.1.2, TEH, metals, PAHs, and VOCs were reported in grab groundwater samples. The highest TEH concentrations in groundwater were significantly below the solubility based ESL and the nuisance odor threshold for non-drinking water, but were above the taste and odor threshold ESL and the toxicity ESL for drinking water (Table 7). The concentrations of metals were all below the ceiling level ESLs for drinking water and non-drinking water and the groundwater screening levels based on drinking water toxicity (Table 8). Only one PAH compound, naphthalene (Table 9), was detected in one sample significantly below the nuisance odor and final screening level for drinking water and the ESL for the evaluation of vapor intrusion for commercial use and residential use. No VOCs were reported above the ESLs for the evaluation of potential vapor intrusion concerns (Table 10).

Although the highest concentrations of TEH compounds are above the taste and odor threshold and toxicity-based ESLs for drinking water, TEH concentrations are below the nuisance odor threshold for non-drinking water and the City's Ordinance 07-006 currently prohibits groundwater use for municipal, domestic, industrial, and agricultural purposes. Therefore, shallow groundwater beneath the City will not be used for drinking water in the foreseeable future. In addition, as discussed above, after soil excavation, only two samples collected at a depth of 1 foot will contain TPHd concentrations slightly above the soil leaching screening level for non-drinking water and only one deeper sample collected at 4 feet bgs will contain a TPHd concentration slightly above the soil leaching screening level for drinking water (Table 3). Decreasing concentrations of TEH in soil with increasing depth indicates that significant migration of TEH compounds to groundwater has not and is not occurring. Migration of residual TPHd to groundwater will also be limited because soil borings indicate that most of the soil beneath the site fill is silty clay and sandy clay. The area inside the warehouse is covered with a concrete slab, which also reduces the potential for vertical migration to groundwater. Therefore, it is expected that the concentrations of TEH constituents in groundwater will decrease in the long-term and active cleanup of groundwater is not warranted.

This long-term strategy for the protection of groundwater is consistent with the RWQCB's East Bay Plain Groundwater Basin Beneficial Use Evaluation Report (Final Report, 2001) that states that no extractive beneficial uses are planned for Emeryville in the future and that aggressive cleanup may not be warranted when the plume is shallow, concentrations are declining, and no beneficial uses are threatened.

5. ANALYSIS OF BROWNFIELDS CLEANUP ALTERNATIVES

This section identifies and describes four Brownfields cleanup alternatives, evaluates the alternatives for effectiveness, implementability, and cost, and compares the alternatives.

5.1. Identification and Evaluation of Alternatives

Four Brownfields cleanup alternatives were identified as appropriate for this site based on Ninyo & Moore's experience with similar sites. These alternatives are no action, paving, soil excavation and off-site disposal, and in-place treatment.

Evaluation criteria include effectiveness, implementability, and cost. Effectiveness addresses how well a removal action satisfies the removal action objectives in the short and long term, and addresses protection of human health and the environment during construction and implementation of the action. Implementability addresses the technical and administrative feasibility of an alternative, the availability of needed goods and services to perform the removal action, and the ability to obtain approvals and permits. Cost evaluates the cost of the alternatives, including both short and long-term costs. The four alternatives are described and evaluated below.

5.1.1. Alternative 1: No Action

Under the no action alternative, impacted soil would remain in place with current concentrations of constituents.

Effectiveness

This alternative does not meet the remedial action objective of reducing the concentrations of TPHd, metals, and benzo(a)pyrene in site soil to below their established cleanup goals. The only reduction in toxicity, mobility or volume of site contaminants would be from natural degradation of TPH and benzo(a)pyrene, which would take a long time. Metal concentrations in soil would likely remain unaffected. The no action alternative could allow exposure of human and ecological receptors to the existing soil contamination. Therefore, the no action alternative would not be effective in meeting the remedial objectives in the short- or long-term.

Implementability

The no action alternative requires no effort.

Cost

No costs would be incurred by the City under the no action alternative.

5.1.2. Alternative 2: Paving

Under the paving alternative, impacted soil would remain in place and the entire former railroad spur area would be paved with a layer of asphalt or concrete. This alternative would involve developing the paving specifications, sending those specifications out to bid to qualified contractors, grading, and paving. Approximately three days would be required to complete the grading and paving activities. In addition, land use restrictions for the site would be recorded in the City's One Stop Interactive Resource Information System (OSIRIS), which is a GIS-based Real Estate Parcel database used by City employees to reference potential contaminants in areas where excavation or construction may occur. Land use restrictions would place limits on land uses for sensitive populations, including residential, day care, hospital, senior care centers, etc. In addition, maps showing concentrations of constituents in soil and groundwater that exceed ESLs would be included in OSIRIS. Future activities would include inspection of the pavement to ensure the protective barrier remains intact and preparation of 5-year reviews.

Effectiveness

This alternative does not meet the remedial action objective of reducing the concentration of TPHd, metals, and benzo(a)pyrene in site soil to below their established cleanup goals and would not prevent exposure to future subsurface construction workers; however, it would prevent exposure to site users. Paving would prevent infiltration and runoff of rain water that could cause the migration of constituents of concern from source areas to groundwater. The only reduction in toxicity, mobility or volume of site contaminants would be from natural degradation of TPH and benzo(a)pyrene, which would take a long time. Metal concentrations in soil would likely remain unaffected. Therefore, the paving alternative would not be effective in meeting the remedial objectives in the short- or long-term.

Implementability

The paving alternative is easily implemented because this alternative would utilize readily available equipment, paving materials, and experienced contractors to perform the work. Land use restrictions and constituent concentrations would be easily entered into OSIRIS.

Cost

The costs to pave the former railroad spur area and enter land use restrictions and constituent concentrations into OSIRIS would be approximately $18,600. Additional consultant and City costs incurred would be associated with future inspections, maintenance of the pavement, and 5-year reviews.

5.1.3. Alternative 3: Soil Excavation and Off-site Disposal

Soil excavation and off-site disposal would involve physical removal of the soil from the site and transportation of the soil to the Kettleman Hills Class I landfill, a permitted landfill, for disposal. Soil would be excavated to a depth of approximately 3 feet bgs in the vicinity of borings B13, B13A, and B15, as shown on Figure 4. The estimated volume of soil for off-site disposal is approximately 115 cubic yards (200 tons). Earthmoving equipment, such as a backhoe to excavate soil and a standard front-end loader to move the soil into trucks would be used. The soil would be direct loaded into trucks or temporarily stockpiled, if necessary. Dust control activities would be implemented to reduce the generation and migration of dust. Confirmation samples would be collected and analyzed for COCs after excavation activities; if concentrations of COCs are reported above cleanup goals, additional soil would be excavated until cleanup goals are met. The area would then be backfilled with clean soil and landscaped. This alternative would involve developing the excavation and disposal specifications, sending those specifications out to bid to qualified contractors, permitting, soil excavation and disposal, backfilling, grading, and landscaping. Approximately five to seven days would be required to complete the soil excavation and disposal, backfilling, and grading activities. Because concentrations of constituents remaining in place after soil excavation will be below direct exposure ESLs for a residential scenario, the land use restrictions that would be established in the City's OSIRIS database would require that the building slab remain in place. If the warehouse building is demolished in the future and the building slab removed, additional evaluation will be conducted at that time. No future activities such as operations, maintenance, monitoring, or a 5-year review would be implemented.

Effectiveness

In the long-term, the soil excavation and off-site disposal alternative would meet the removal action objective of reducing the concentration of TPHd, metals, and benzo(a)pyrene in site soil to below their established cleanup goals to prevent exposure to future subsurface construction workers and site users. Disposing of the soil in a permitted landfill will reduce potential future ecological and human health risks associated with contaminated soil. During excavation activities, dust control methods would improve effectiveness in the short-term while the alternative is being implemented. The removal of contaminant source would also reduce the potential for migration to groundwater. Therefore, this alternative meets the removal action objective in the short- and long-term.

Implementability

The soil excavation and offsite disposal alternative is easily implemented because this alternative would utilize readily available equipment and experienced contractors to perform the work. Adequate transportation capacity exists in the area with numerous licensed hazardous waste haulers available. Adequate capacity exists at the planned disposal facility to provide treatment (if needed) and disposal of 200 tons of impacted soils. Land use restrictions would be easily entered into OSIRIS.

Cost

Costs associated with excavation and off-site disposal would include excavation equipment, soil removal, transport and disposal charges, and confirmation soil sampling.

The cost of soil excavation and offsite disposal of approximately 200 tons of impacted soil classified as California Hazardous non-RCRA waste (Cal-Haz), would be approximately $45,000. This includes the cost of backfilling the excavation, oversight costs, and a 30 percent contingency, which is added to the total cost in case unexpected features are discovered or additional excavation is required.

5.1.4. Alternative 4: In-Place Treatment

The in-place treatment alternative is typically utilized in cases where removal is impractical due to volumes of media to be removed or site constraints preventing removal (structures, utilities, etc.). The selection of the most appropriate in-place treatment option should be based on site conditions, constituent characteristics, and the intended future use of the area.

In-situ treatment can be categorized as either biological/chemical treatment methods or solidification/stabilization treatment methods. In-situ biological/chemical treatment would involve the addition of microorganisms and/or chemicals to the sediments to initiate or enhance bioremediation. In-situ solidification/stabilization treatment would involve the addition of chemicals or cements to encapsulate contaminated sediments and/or convert them into less soluble, less mobile, or less toxic forms. The solidification/stabilization method is more effective for treatment of metals, and can also be effective in treating petroleum related COCs, and, therefore would be a more appropriate remedial approach.

In-place treatment using the solidification/stabilization method would involve the controlled injection and thorough blending of specially-formulated stabilizing reagent(s), such as cement, into the soil through auger mixing assemblies to a depth of approximately 3 feet in the area of excavation outlined in Figure 4. An auger attached to a backhoe or similar construction vehicle would be used. Design parameters for in-place treatment alternatives can be dependent on the following site characteristics: the volume of impacted soil, the porosity of the soil, and the concentrations of the constituents of concern. These soil characteristics would be determined through bench-scale laboratory analytical testing.

This alternative would involve bench-scale laboratory testing, developing the in-place treatment specifications, sending those specifications out to bid to qualified contractors, permitting, in-place soil treatment, and grading. Approximately two days would be required to complete the in-place soil treatment and grading activities. Additional measures such as paving or a fence and plastic ground cover may be required to prevent weathering or potential exposure to the surface of treated soil. Land use restrictions would be established in the City's OSIRIS database to prevent the site from being used by residential and sensitive populations, and constituent concentrations also will be recorded in OSIRIS. Future activities would include maintenance, monitoring, and a 5-year review of this alternative.

Effectiveness

This alternative does not meet the remedial action objective of reducing the concentration of TPHd, metals, and benzo(a)pyrene in site soil to below their established cleanup goals; however, it would reduce health risks from potential exposures to site users, as well as ecological receptors. Potential exposure could still occur for construction workers if trenching or other construction related activities were conducted in the area of the treated soil. Toxicity and mobility would be reduced by the treatment, but volume may increase due to added treatment chemicals. In place treatment of the contaminant source would reduce the potential for migration to groundwater; however, it may not be an effective long term solution as weathering of the solidified soil could potentially cause stabilized COCs to become mobile as particulates or in dissolved form. Therefore, this alternative only partially meets the removal action objective in the long term.

Implementability

The in-place treatment alternative is easily implemented because this alternative would utilize readily available equipment and experienced contractors to perform the work. Land use restrictions and site conditions would be easily entered into OSIRIS.

Cost

Costs associated with the in-place treatment option would include bench-scale testing, excavation equipment, soil mixing equipment and cement. The cost to perform solidification/stabilization treatment methods are estimated at approximately $200 per cubic yard. With a contingency of 20% and oversight costs this equals a total of $30,000 for the treatment of the 115 cubic yards of impacted soil on site.

Additional consultant and City costs would be associated with establishing the land use restrictions and entering constituent concentrations into OSIRIS, future inspections and maintenance of the treated material, and 5-year reviews.

5.2. Comparison of Alternatives

The no action alternative would not be effective in meeting the remedial objectives in the short- or long-term because it would require a very long time to reduce the TPH and benzo(a)pyrene by natural attenuation. In addition, metals would not be reduced at all. The paving alternative would be effective in the short-term because dust generation and access to the soil would be controlled quickly, but future construction workers may still come in contact with the soil in the long-term and there would be no reduction of toxicity, mobility, or volume of the soil contaminants. Excavation and off-site disposal would be less effective in the short-term while excavation is implemented; however, this alternative would be of short duration, workers would be OSHA trained, and dust control measures would be implemented. Excavation and off-site disposal would be more effective in the long-term because impacted soil would be removed, reducing the toxicity, mobility, and volume of the COCs. There would be no significant time difference between the in-place treatment alternative and the excavation alternative because both would be completed in a short period of time. However, the in-place treatment method would be less effective in the long term due to potential weathering of the solidified material. In addition, future subsurface construction workers may come in contact with the COCs in the solidified material.

All four alternatives are technically implementable; however, in-place treatment would have more technical challenges associated with designing and implementing the treatment.

Costs associated with the no action alternative would be minimal, and only related to entering the land use restrictions and constituent concentrations into OSIRIS. The cost for the paving alternative would be approximately $18,600 and the cost for in-place treatment would be approximately $30,000, both less than the approximately $45,000 cost of excavation and off-site disposal, However, there would be additional costs associated with future inspections, maintenance, and reviews of the paved and in-place treatment alternatives.

Although the costs may be somewhat higher initially, the excavation and off-site disposal alternative would be more effective than the other three alternatives and would be easily implemented. Therefore, excavation and off-site disposal is the selected removal action alternative. Implementation of the selected remedy is described in 6 and 7.

6. PLANS AND PERMITS

This section discusses the applicable requirements that must be met during implementation of the removal action, including public participation, hazardous waste management, notification of the Bay Area Air Quality Management District (BAAQMD), a site Health and Safety Plan (HSP), site permits and notices, air quality during excavation activities, a storm water pollution prevention plan, and a hazardous waste transportation plan.

6.1. Public Participation

To address community concerns and to fulfill the requirements of public participation for the SCP and ABCA process, Ignacio Dayrit, Project Coordinator, has been designated the project spokesperson. Mr. Dayrit can be reached at (510) 596-4356 or idayrit@ci.emeryville.ca.us. The spokesperson will coordinate news releases, notify local citizens, establish an administrative record, and notify the public of the administrative record. A mailing list will be generated for properties located within a minimum 300-foot radius of the site, per the City of Emeryville 2005 Public Participation Plan, and a fact sheet describing the site, what was found on the site, and the City's proposed clean up activities, will be mailed to those properties. A public notice, advertising a public meeting to discuss the removal action, will be published beforehand in local newspapers.

The public will have a 30-day period to comment on the SCP and ABCA. Following the 30-day public comment period, a Responsiveness Summary summarizing public comments on the SCP and ABCA will be prepared and included in the administrative record.

6.2. Hazardous Waste Classification and Management

The site remediation involves the physical removal of the impacted soils and transportation of those soils to an acceptable permitted landfill for disposal. The soil was classified prior to the preparation of this report by collecting in-situ soil samples at depths of 1 to 4 feet bgs in several areas within the former railroad spur area. Figure 3 shows the borings where samples were collected for waste classification purposes and the area of excavation required to remove COC-impacted soil. The soil was found to be impacted with metals, including chromium, copper, lead, nickel, vanadium, and zinc (Table 12). Because these metals were reported with concentrations greater than 10 times the soluble threshold limit concentrations (STLCs), and in order to classify the soil for landfill acceptance, waste extraction tests (WETs) were run by the laboratory to determine the solubility concentration of the metals in the soil. Following laboratory WETs, the soil samples reported with lead concentrations greater than the STLC were designated as Class I waste. To further classify the soil as either California-Hazardous (Cal-Haz) or RCRA waste, these samples were analyzed using the toxic characteristic leaching procedure (TCLP). All samples analyzed by the TCLP were reported as having concentrations below RCRA waste levels; therefore, the soil in the excavation area will be classified as Cal-Haz waste.

6.3. BAAQMD

The BAAQMD will be notified of site excavation activities, and a notice of compliance will be obtained prior to excavation.

6.4. Sampling and Analysis Plan

After soil excavation, sidewall and bottom confirmation soil samples will be collected and analyzed for site COCs. Confirmation samples will be collected in accordance with the Confirmation Sampling and Analysis Plan (CSAP) included in Appendix A and discussed in Section 7.5. If confirmation sample analytical results reveal concentrations in excess of cleanup goals, additional excavation will occur in the direction of the failing sample until subsequent confirmation samples do not exceed the cleanup goals. The CSAP includes procedures for post-excavation confirmation soil sampling to demonstrate impacted soil has been removed from the site. The CSAP also includes provisions for sampling imported backfill materials to demonstrate that contaminated materials are not being imported to the site and that backfill is suitable for future uses. Backfill will be analyzed per the DTSC Information Advisory Clean Imported Fill Material dated October 2001 (DTSC, 2001). Additionally, data and source information on proposed backfill will be provided to the City prior to bringing the backfill soil to the site.

6.5. Ninyo & Moore's HSP

For the safety and protection of site workers, a health and safety plan (HSP) was prepared by Ninyo & Moore and is included in Appendix B. It is written specifically for Ninyo & Moore personnel during excavation activities at the site. The HSP describes the work to be performed and addresses health and safety concerns with respect to proposed excavation activities, as well as personal protection requirements and safe working practices, monitoring and site control procedures, and contingency plans for emergency situations.

A separate HSP will be prepared for site workers by the general contractor, which will be submitted to Ninyo & Moore and the City for review prior to the commencement of field activities.

6.6. Permits and Notices

For on site excavation activities, a General Construction Permit will be acquired from the RWQCB by the City of Emeryville and a Notice of Compliance will be acquired from the BAAQMD by the contractors.

6.7. Air Quality During Excavation Activities

This section discusses the potential exposure of workers at the former railroad spur area and the surrounding neighborhood to airborne COCs and describes how controlling the site for total visible dust will effectively control the airborne hazard for each of the contaminants of concern. Controlling the visible dust during excavation will ensure good air quality for workers at the site as well as for the surrounding neighborhood.

6.7.1. Air Quality Standards

Calculations were performed on individual contaminants of concern (metals) to ascertain whether these contaminants were present in site soil in concentrations high enough to pose a significant airborne hazard to site workers and to the surrounding neighborhood. These calculations used the highest levels of each contaminant found in the Limited Phase II ESA and the ASI and assumed that these levels represented the average concentrations of contaminants dispersed in site soil throughout the work area. With the exception of lead, each of the contaminants reviewed (including arsenic, cadmium, copper, chromium, and cobalt) would need to be present in site soil in concentrations nearly an order of magnitude above those detected to reach the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs) prior to the TLV being exceeded for total dust, which is 10 milligrams per square meter (mg/m^3). In the case of lead, the contaminant would have to be present in concentrations at least five times the measured concentration in the most contaminated sample. ACGIH TLVs should not be used as screening goals for the protection of residents, but are only used here to illustrate how unlikely an overexposure to any of the site contaminants would be under any site conditions, even to workers working directly with the soil at the site during very dusty operations. Calculations of risk for local residents were not considered necessary due to the levels and types of contaminants illustrated by the maximum contaminant concentrations measured at the site.

In order to limit potential airborne exposure to on and off site occupants during remediation activities on site, nuisance dust at the site will be controlled for total visible dust as described in the dust control plan (Section 7.4) and air and dust monitoring will not be performed. Good industrial hygiene practice would still indicate the use of nitrile or latex gloves when handling soil samples potentially contaminated with metals, and washing of hands and exposed skin after working in this environment, especially before eating, drinking, or smoking.

6.8. Storm Water Pollution Prevention Plan

A Storm Water Pollution Prevention Plan (SWPPP) will be prepared by the general contractor prior to the commencement of excavation activities at the site. The objective of the SWPPP is to outline storm water and sediment control measures at the site. The recommended SWPPP template for this project is the California Department of Transportation SWPPP located at the following website address: http://www.dot.ca.gov/hq/construc/stormwater/SWPPP_Template_07-17-07.doc.

6.9. Transportation Plan and Permits

Transportation of soil on local streets and highways will be in accordance with applicable City of Emeryville Department of Parking and Transportation, the California Highway Patrol, and the DOT requirements. Manifests accompanying trucks containing hazardous waste for off-site disposal, and clean backfill, are discussed in Sections 7.6.6 and 7.8.3, respectively.

7. REMOVAL ACTION IMPLEMENTATION

Site preparation and security are discussed in the following sections, along with proposed documentation of site activities, a discussion of excavation activities, dust control plan preparation, confirmation sampling methodology, the transportation plan for off-site soil disposal, the site restoration plan, and the schedule of completion.

7.1. Site Preparation and Security Measures

7.1.1. Delineation of Excavation Area

Ninyo & Moore used a standard polygonal method to develop an area of contamination for each boring sampled in the former railroad spur area during previous subsurface investigations. The resulting excavation area is shown on a plan view (Figure 3) and cross section (Figure 4). COC-impacted soil above recommended CGs was reported in samples from borings B13, B13A, and B15 located in the center of the former railroad spur area. The western extent of COC-impacted soil was interpreted to be approximately half the distance between boring B17 and the boring at the westernmost end of the COC-impacted area (boring B15), and the eastern extent of COC-impacted soil was interpreted to be approximately half the distance between boring B13 and boring B16. The depth of impacted soil to be excavated was determined by identifying the deepest soil sample exceeding CGs, and excavating to the next clean sample. For example, impacted soil exceeding CGs was detected in samples from the 2-foot depth at borings B13 and B15 (lead in boring B15, and TPHd in boring B13) and not reported at levels exceeding proposed CGs in samples at the 3-foot depth (since samples were not collected from 3 feet bgs at B13, data from B13A were used). The depth of excavation will therefore extend to 3 feet bgs.

The area and depth of excavation shown on Figures 3 and 4 consists of an area of approximately 350 square feet with an average depth of approximately 3 feet bgs. The total volume of impacted soils (requiring remediation) was estimated to be 115 cubic yards or approximately 200 tons.

The south and north excavation area boundaries extend along the 40th Street property line and along the southern border of the site building, respectively. Because excavation limits extend to the sidewalk bordering 40th Street, sloping of the excavation walls or shoring will be considered to mitigate soil disruption beneath the sidewalk. According to a test pit trenching survey of the south-side building footings by Ninyo & Moore (Ninyo & Moore, 2008b), the footings adjacent to the excavation area are buried to approximately 3 feet bgs. Since excavation is not anticipated to occur below 3 foot depths, the building footings will not be disturbed. If cleanup goals are not achieved at the northern and southern excavation boundaries, no additional excavation will occur in these directions due to the physical constraints imposed by the building and the sidewalk, respectively. The confirmation sample results would be placed into the City of Emeryville's OSIRIS database for reference by the City if sidewalk or footing removal should occur in the future.

7.1.2. Utility Clearance

An underground utility check will be requested from Underground Service Alert to check for buried pipes and underground cables that may be present at the excavation area. Additionally, all work areas will be cleared by an independent utility locator prior to excavation or movement of heavy equipment into or through utility corridors and on-site utilities will be shut off and disconnected prior to excavation activities. A utility locator subcontracted during test pit trenching activities observed a suspected electrical line within the proposed area of excavation that connects with a traffic camera located adjacent to the sidewalk along 40th Street. Additionally, an approximate 8-inch-diameter sewer line was observed at approximately 2½ feet bgs extending from the southeast corner of the warehouse trending in a southwest direction toward the sidewalk.

7.1.3. Security Measures

A fence will be constructed around the former railroad spur area as illustrated in Figure 5. The fence will be erected on the eastern site border, on the south edge of the parking lane on 40th Street and the northeast corner of Hollis and 40th Street. The sidewalk will be closed adjacent to the site on 40th Street, and the bus stop will temporarily be moved to the east, pending Alameda Contra Costa County Transit District (AC Transit) authorization.

7.1.4. Contaminant Control

Cross contamination between contaminated soil and clean soil at the site will be avoided by dry brushing the tires and bodies of excavation equipment when moving between impacted soil and clean soil. Plastic sheeting will also be laid down on areas of the site where non-COC-impacted soil is located to prevent cross contamination from COC-impacted soil. At the end of each day, each soil hauling and loading vehicle will be swept down in the decontamination area (discussed in Section 7.3.2). The sidewalk and parking lane within the loading area will also be swept daily to prevent soil and dust from leaving the site.

7.2. Field Documentation

7.2.1. Field Notes

Site activities will be documented in daily field reports (DFRs). The DFRs will include information on site personnel, temperature, wind direction, precipitation, dust control, excavation activities, confirmation sampling, and grading activities. Confirmation sample IDs, time and date of sample collection, and their locations will also be included.

7.2.2. Chain-of-Custody Documentation

Chain-of-custody documentation will accompany confirmation samples sent to the laboratory for analysis. This documentation will track sample possession from the time the sample is collected until it is analyzed. The following will be recorded on the chain-of-custody forms: project name, project location, project number, samples, client name, project manager, sample identification name, date and time sample was collected, sample matrix (soil, wastewater etc.), number of sample containers, required analytical test methods, remarks/observations specific to the sample, number of samples to be relinquished to the analytical laboratory, transfer signatures associated with relinquishing samples (the sampler will initiate the chain-of-custody procedure), courier/laboratory representative signature (for commercial carrier, record air bill number), date/time of custody transfer, comments regarding the condition of the samples (e.g., cooled with ice, etc.), sampler signature, courier signature, and additional comments (including written request for electronic file for all samples analyzed, information regarding sample storage/disposal, and turn-around-time requirement). Additional chain-of-custody information is provided in the CSAP presented in Appendix A.

7.2.3. Photographs

Photographs will be taken of the excavation, confirmation sampling, backfill, compaction, and grading activities at the site.

7.3. Excavation

7.3.1. Temporary Storage Operations

Construction-related materials and equipment used in the excavation process will be stored inside the warehouse during non-working hours.

7.3.2. Decontamination Plan

A decontamination area will be set up in the southwestern corner of the site in the parking/bicycle lane (Figure 5). Large equipment and vehicles requiring decontamination include excavation equipment, soil loading equipment, and off-site disposal trucks. Dry decontamination procedures will be used primarily. Prior to departure, the off-site disposal trucks will move to a decontamination area where loose soil will be removed via dry brushing tires and truck body. The loading and decontamination areas will be swept after each vehicle has departed to minimize affected soil contacting the tires of the next vehicle. Performance criteria will include no visible soil adhering to the truck body or tires upon exiting the site. At the end of each day, each soil hauling and loading vehicle will be swept down in the loading area. A street sweeper may be utilized for the local street route. The general contractor will develop a decontamination plan that will be submitted to the City for review prior to the start of transportation activities. The City will oversee the decontamination activities, and suspend trucking activities if the performance criteria mentioned above is not met.

7.3.3. Excavation Plan

Figures 3 and 4 show the areas designated for excavation based on existing data. A backhoe and a standard front-end loader will be used to excavate and move the soil into trucks for off-site disposal. Figure 5 shows a plan of the excavation area. Trucks will enter the fenced-off site area from the east, load up on the eastern portion of the site, move to the decontamination area located on the western portion of the site, and then leave the site from an exit gate located near the northeast intersection of Hollis Street and 40th Street.

7.3.4. Contingencies for Unexpected Conditions are Encountered

The City of Emeryville will be notified if visibly contaminated soils are encountered on site that require additional investigation and/or remediation. The soil will be segregated by placing it on and covering it with plastic sheeting and then characterized for proper disposal. Confirmation samples will be collected and analyzed for additional constituents reported above screening criteria in the characterization samples. If a tank is encountered, the City and Alameda County will be notified and tank removal requirements will be followed.

7.4. Dust Control

Dust suppression will be accomplished by lightly spraying or misting stockpiled soil, truck loading areas on-site, and the work areas with water. Misting may also be used on soil placed in the transport trucks. Misting will be performed sufficiently to reduce dust and vapors emissions but in small enough quantities so as to avoid puddling and runoff. In addition, efforts will be made to minimize the soil drop height from the excavator's bucket onto the soil pile or into the transport trucks. After the soil is loaded into the transport trucks, the soil will be covered to prevent soil from spilling out of the truck during transport to the disposal facility.

While on the property, all vehicles will maintain slow speeds (i.e., less than 5 miles per hour [mph]) for safety purposes and for dust control measures. Prior to departure, transport and dump trucks will be cleaned of loose debris clinging to the sides and/or wheels using dry brooms or brushes to minimize off-site contaminant mobilization. If conditions warrant, a street sweeper may be retained to sweep the local street route.

In the event of sustained wind speeds that cause visible fugitive emissions, soil-moving activities will be temporarily halted until sufficient dust control agent is applied to reduce such emissions. In the event wind speeds exceed 25 mph for more than 30 minutes and visible emissions are observed, soil-moving activities will be halted until wind speeds decrease and no visible emissions are observed.

If stockpiling of soil is necessary, excavated soil will be placed on, and covered with, 6- or 10-mil polyethylene Visqueen sheets anchored in place using sandbags and rocks.

7.5. Confirmation Sampling

Post-excavation confirmation soil samples will be collected according to the CSAP in Appendix A. A discrete soil sample will be obtained for every 25 linear feet of horizontal sidewall, or portion thereof, and every 3 feet of vertical sidewall, or portion thereof. Confirmation samples will be analyzed for the COCs detected above cleanup goals (TPHd, benzo(a)pyrene, arsenic, cadmium, total chromium, lead, and vanadium)(Table A-2 of the CSAP). A Proposed Confirmation Soil Sample Location Map was prepared and is included in Appendix A.

During the Phase II and ASI, soil samples were collected at certain depths to estimate the depths at which COCs were below CGs. TPHd was reported above CGs at 2 feet bgs in boring B13 but a deeper sample was not collected. Therefore, a confirmation sample will be collected from the floor of the excavated area at B13 and analyzed for TPHd, the only constituent reported above CGs in the two foot sample.

Soil samples will be collected at a depth of approximately 6 inches to 1 foot into the exposed surface. If COCs are measured in the samples at concentrations greater than CGs, the impacted soil will be excavated an additional 1 foot in a direction perpendicular to the surface.

No additional excavation will occur in the northern or southern directions due to physical obstructions (See Section 7.1.1).

7.6. Transportation Plan for Off-Site Disposal

The objective of the Transportation Plan (TP) is to outline the off-site transportation of contaminated soil from the site. This plan describes safe transportation and removal methods to minimize potential environmental and human health risks. The plan addresses material destination, traffic control, transportation mode, safe truck loading methods, transportation destination and route, record keeping, and health and safety concerns with respect to soil removal and transportation.

Soil transportation and disposal activities will include loading, transport, and disposal of California-hazardous Class I waste. Loading will be performed by a licensed remediation contractor.

7.6.1. Destination of Material

Hazardous soil and waste will be transported to the following Class I facility, which is an approved disposal facility identified as accepting waste and impacted soil.

Name:	Kettleman Hills Disposal Facility
Address:	35251 Old Skyline Road, Kettleman City, California 93239-0471
Phone No.:	800-222-2964

7.6.2. Traffic Control

South of the excavation area, the parking and bicycle lanes will be fenced off to facilitate truck loading (Figure 5). This will involve traffic control at the site, including truck staging, speed control, truck routes, and entry/exit locations. Trucks will enter from the east along 40th Street and exit from the west along 40th Street. A flagman will be located at the entrance/exit to control traffic while trucks are entering/exiting the site.

Lane closure(s) will be conducted, and traffic signage will be posted along 40th Street indicating that trucks are entering and exiting the site.

7.6.3. Staging and Loading Procedures

The soil transport vehicles will be loaded using either a backhoe or a standard front-end loader. The loading will be conducted in such a manner as to reduce the potential to generate dust and vapor as discussed in Section 7.4.

7.6.4. Transportation Mode

Department of Transportation (DOT)-approved, placarded, end-dump or bottom dump trucks will transport excavated soil to the appropriate off-site disposal facility. The number of vehicles to be used for soil loading and transport will be minimized to avoid generating excess decontamination wastes. Waste haulers will be required to provide proof of valid registrations and permits for hazardous waste transport. The vehicles will be properly registered, operated, and placarded in compliance with local, state, and federal requirements. Trucks will be inspected by the general contractor technical staff representative before leaving the site to verify that they are properly registered, operated, and placarded in accordance with the requirements.

7.6.5. Transportation Route

Trucks going to Kettleman Hills Landfill will head west on 40th Street. They will turn south onto Horton Street and then southwest onto Mandela Parkway until 7th Street where they will turn east. Trucks will turn south at Adeline Street and then turn east at 5th Street onto the Highway 880 southbound onramp. Trucks will continue on Highway 880 until the Highway 238 interchange. Trucks will head east on Highway 238 until Highway 238 merges with Highway 580. Trucks will continue east until the Highway 580 and Highway 5 interchange. At the Highway 580 and Highway 5 interchange, trucks will head south onto Highway 5 to Kettleman City. Figure 5 shows the city street truck route. The truck route to the Kettleman Hills Landfill is shown in

Figures 7-1 and 7-2. The time required for a one-way trip from the site to Kettleman Hills Landfill is estimated at approximately three hours.

Prior to initiating soil removal activities, vehicle transportation routes will be agreed upon by the soil transport contractor. In addition, an alternate route will be agreed upon in the event of a traffic accident affecting the original travel route.

7.6.6. Record Keeping

Prior to loading each waste transport vehicle, the vehicle will be inspected for general roadworthiness. Hazardous waste manifests will be prepared by the transporter, and the manifests will be signed by the City or Agent for the City prior to off-site transport. The driver will then sign the manifest, leave a copy with the designated on-site records keeper, and depart the site. Once the vehicle reaches the disposal facility, the vehicle will be weighed and the load weight will be noted on the manifest (or bill of lading). The vehicle driver will sign the manifest releasing the soil to the treatment/disposal facility. A representative from the disposal facility will sign the manifest and leave a copy with the driver. A copy of the completed manifest will be forwarded to the City. Copies of treatment and/or disposal documentation for wastes generated at the site will be included in a report on the field activities.

7.7. Contractor's HSP

The general contractor will develop an HSP for its workers that will be submitted to Ninyo & Moore and the City for review prior to the start of transportation activities. The contractor's HSP will present conditions that may be encountered at the site and includes work activities related to the excavation of soil and the transport and disposal of waste material from the site. The contractor's HSP must be similar in scope to the Ninyo & Moore HSP located in Attachment D of the CSAP.

Field personnel will be 40-hour Hazardous Waste Operator (HAZWOPER)-trained and will review and sign the HSP prior to commencing the field activities. Field monitoring activities will be recorded, and the HSP will be maintained in the project files. A copy of the HSP will remain on-site during field activities. The general contractor will designate their own health and safety officer, as well.

7.8. Backfill and Site Restoration

7.8.1. Borrow Source Evaluation

The remediation contractor will collect soil samples from a borrow source and will have laboratory analyses performed by a California state-certified analytical laboratory in advance of backfill trucks arriving at the site. The borrow source will be documented and samples will be analyzed following the DTSC guidelines discussed in the Information Advisory – Clean Imported Fill Material fact sheet, dated October 2001 (DTSC, 2001). Analytical results and all appropriate historical documents required by the DTCS guidelines shall be submitted to Ninyo & Moore and the City will approve the soil before import soil arrives at the site.

7.8.2. Backfilling

Imported backfill material will be either stockpiled or placed directly in the excavation, and compacted to the compaction rate as required by City specifications.

7.8.3. Load Checking

The manifest accompanying each truck will be checked to ensure the backfill material is from the clean borrow source.

7.8.4. Diversion of Unacceptable Borrow

Backfill will be confirmed as having been obtained from the clean borrow source in advance of backfill trucks departing the backfill source location. If the backfill is not confirmed to have been obtained from the confirmed clean borrow source, the material will be rejected.

7.8.5. Documentation of Rejected Loads

Rejected backfill loads will be documented in the Daily Report of Field Observations.

7.8.6. Site Restoration

According to the City, after the contaminated soil has been excavated, clean backfill material will be either stockpiled before being placed into the excavation pit, or placed directly into the excavation pit and compacted to the compaction rate required by City specifications. Subsequent to compaction, the area at the southern end of the site will be landscaped.

7.9. Project Schedule and Report of Completion

No formal schedule has been proposed regarding the commencement of field activities; however, estimated start of field activities is middle to late summer 2008. Although no formal timeline for soil remediation has been established for this site, field work would ideally be completed within one month of the beginning of remediation.

8. LIMITATIONS AND EXCEPTIONS OF THE ASSESSMENT

The opinions and recommendations presented in this report are based upon previous site investigations, document reviews, and discussions with remediation contractors. The opinions presented herein apply to site conditions existing at the time of our SCP and ABCA and are based on previous data acquired by Ninyo & Moore and on information provided by City of Emeryville with personal knowledge of the site. Thus, this information cannot be taken to apply to site changes or conditions of which we are not aware and/or have not had the opportunity to evaluate.

This document is intended to be used in its entirety. No portion of the document, by itself, is designed to completely represent any aspect of the project described herein. Ninyo & Moore should be contacted if the reader requires any additional information, or has questions regarding project information, or the content, interpretations presented, or completeness of this document.

Opinions and judgments expressed herein, which are based on our understanding and interpretation of current regulatory standards and reviewed documents, should not be construed as legal opinions. In the event conditions change from those described in this SCP and ABCA, Ninyo & Moore reserves the right to review such conditions and to modify, as appropriate, the content and conclusions provided in this report.

9. REFERENCES

California RWQCB, 2001, East Bay Plain Groundwater Basin Beneficial Use Evaluation Report, Final Report, dated April 21.

City of Emeryville, 2005, Public Participation Plan, dated July.

City of Emeryville, 2007, Ordinance No. 07-006, dated May 1.

Colman, S.G., 2005, Conditional Approval of Removal Action Workplan, Glashaus Site, 1269, 1289, and 1301 65th Street, Emeryville, dated October 3.

Department of Toxic Substances Control, 2001, Information Advisory – Clean Imported Fill Material, dated October.

Ninyo & Moore, 2005a, Phase I Environmental Site Assessment, 4060-4062 Hollis Street, Emeryville, California, dated July 26.

Ninyo & Moore, 2005b, Hazardous Building Materials Survey, 4060-4062 Hollis Street, Emeryville, California, dated August 3.

Ninyo & Moore, 2006, Limited Phase II Environmental Site Assessment, 4060-4062 Hollis Street, Emeryville, California, dated February 1.

Ninyo & Moore, 2007, Final Site Cleanup Plan, 1333-1379 62nd Street, Emeryville, California, dated October 19.

Ninyo & Moore, 2008a, Additional Site Investigation, 4060-4062 Hollis Street, Emeryville, California, dated May 12.

Ninyo & Moore, 2008b, Test Pits, 4060 Hollis Street, Emeryville, California, dated March 4.

San Francisco Bay Regional Water Quality Control Board, 2007, Bay Area Region Screening For Environmental Concerns at Sites With Contaminated Soil and Groundwater, Interim Final, dated November (Updated May 2008).

10. SIGNATURE OF ENVIRONMENTAL PROFESSIONAL

Kris M. Larson, P.G.
Senior Environmental Geologist

11. QUALIFICATION(S) OF ENVIRONMENTAL PROFESSIONAL

Mr. Larson states that the SCP and ABCA was performed under his direct supervision, and he has reviewed and approved the report, and that the methods and procedures employed in the development of the report conform to the regulatory standards. Mr. Larson certifies that Ninyo & Moore project personnel and subcontractors are properly licensed and/or certified to do the work described herein.

TABLE 3

SOIL SAMPLE LABORATORY ANALYTICAL RESULTS
TOTAL EXTRACTABLE HYDROCARBONS

	Analyte		
	TPHd	TPHmo	TPHhf
Sample ID	Analytical Results (mg/kg)		
Warehouse Area Samples			
B1-S-2-1	3.1 HY	9.80	13 Y
B1-S-5-1	<1 0	<5.0	<5.0
B1-S-13-1	1.4 Y	<5.0	<5.0
B2-S-2-1	7.1 HY	7.4 HY	14
B3-S-2-1	140 HY	140 Y	280
B30-S-2-1	6.3 HY	19 Y	25
B3-S-5-1	33 HY	43 L	79
B3A-S-2-1	2.1	1.4	11
B3A-S-2-2[1]	13	13	10
B3A-S-5-1	<1.0	<1.0	<10
B3A-S-13-1	<1.0	<1.0	<10
B4-S-2-1	2.7 HY	5.4 Y	8.2 Y
B5-S-2-1	1,800 HY	1,900 Y	3,600
B5-S-5-1	61 HY	87	140 Y
B5-S-13-1	8.9 HY	12	20 Y
B5A-S-2-1	17	30	35
B5A-S-5-1	6.0	2.1	<10
B5A-S-14-1	1.5	1.3	<10
B5B-S-2-1	5.6	1.9	<10
B51B-S-2-1[2]	2.2	1.6	17
B5B-S-5-1	<1.0	<1.0	<10
B5B-S-13-1	2.8	1.8	<10
B5C-S-2-1[3]	1.3	<1.0	<10
B5C-S-5-1	2.0	1.5	<10
B5C-S-14-1	<1.0	<1.0	<10
B6-S-2-1	1.1 HY	<5.0	5.4
B7-S-2-1	1.8 HY	6.4 Y	8.40
B8-S-2-1	3.5 HY	8.7 HY	12
B9-S-2-1	2.5 HY	8.1 Y	11
B10-S-2-1	3.4 HY	10 Y	13
B11-S-2-1	1.3 HY	7.6 Y	8.5
B11-S-5-1	7.9 HY	20	28
B11-S-10-1	1.6 HY	<5.0	5.1
B11-S-15-1	4.3 HY	17 Y	21
B18-S-2-1	14	21	28
B181-S-2-1[4]	27	46	56
B18-S-5-1	32	36	29
B18-S-17-1	13	15	33
Former Railroad Spur Area Samples			
B13-S-1-1	4,100 HY	6,500 Y	10,000
B13-S-2-1	3,400 HY	5,700 Y	8,800
B13A-S-1-1	58	100	160
B13A-S-2-1	5.6	2.0	<10
B13A-S-3-1	250	390	260
B13A-S-4-1	5.6	5.8	11
B14-S-1-1	190 HY	980 Y	1,200
B14-S-2-1	53 HY	170 Y	230
B15-S-1-1	500	1900	2300
B15-S-2-1	8.3	35	42
B15-S-3-1	<1.0	<5 0	<5.0
B16-S-1-1	310	680	940
B16-S-2-1	180	390	550
B16-S-3-1	160	340	480

TABLE 3

SOIL SAMPLE LABORATORY ANALYTICAL RESULTS
TOTAL EXTRACTABLE HYDROCARBONS

	Analyte		
	TPHd	TPHmo	TPHhf
Sample ID	**Analytical Results (mg/kg)**		
B16-S-4-1	**86 HY**	**98 L**	**180 L**
B17-S-1-1	**2.5**	**27**	**33**
B17-S-2-1	**2.8**	**14**	**17**
B17-S-3-1	<1.0	<5.0	**5.5**
B25-S-2-1[5]	**2,000 HY**	**3,500**	**5,300**
B30-S-2-1[6]	**6.3 HY**	**19 Y**	**25**
ESLs (Table G Drinking)	83	--	--
ESLs (Table G Non-Drinking)	180	--	--
ESLs (Table K-1 Residential)	540	1,800	1,800
ESLs (Table K-2 Commercial)	2,200	18,000	18,000

Notes:

TPHd = Total Petroleum Hydrocarbons as Diesel analyzed by EPA Method 8015B
TPHmo = Total Petroleum Hydrocarbons as Motor Oil analyzed by EPA Method 8015B
TPHhf = Total Petroleum Hydrocarbons as Hydraulic Fluid analyzed by EPA Method 8015B
<n indicates concentration below laboratory detection limit of n
mg/kg = milligrams per kilogram
H indicates heavier hydrocarbons contributed to the quantitation
Y indicates the sample exhibits a chromatographic pattern which does not resemble standard
L indicates lighter hydrocarbons contributed to the quantitation
Bold lettering indicates concentrations greater than laboratory reporting limits
ESL Table G are the current San Francisco Bay RWQCB Soil Leaching Screening Levels for Drinking and Non-Drinking Water Resources. Note: these values were calculated for vadose-zone soil conservatively assumed to be very permeable sand that freely allows the migration of leachate to groundwater. Soil at the former railroad spur area was observed to be fine sandy clay between approximately 1 5 feet and at least 4.5 feet bgs Therefore, this soil type would be a greater inhibiter of the migration of leachate to groundwater than very permeable sand and thus be more protective of groundwater quality.
ESL Table K-1 are the current San Francisco Bay RWQCB Residential Exposure Scenario - Direct Exposure Soil Screening Levels where Hazard Quotient = 1 for non-carcinogens.
ESL Table K-2 are the current San Francisco Bay RWQCB Commercia/Industrial Land Worker Exposure Scenario - Direct Exposure Soil Screening Levels where Hazard Quotient = 1 for non-carcinogens.
Shaded cells indicate concentrations reported greater than commercial ESLs.
[1] Laboratory QA./QC sample
[2] Duplicate sample of B5B-S-2-1
[3] Sample used for Level IV data analysis, data does not match those of fresh reference fuel standard and chromatogram not indicative of the presence of weathered or mixed hydrocarbons.
[4] Duplicate sample of B18-S-2-1
[5] Duplicate sample of B5-S-2-1
[6] Duplicate sample of B10-S-2-1
-- = Not Applicable

TABLE 4
SOIL SAMPLE LABORATORY ANALYTICAL RESULTS
TITLE 22 METALS

Analyte	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
Sample ID	**Analytical Results (mg/kg)**																
	Warehouse Area Samples																
B3A-S-2-1	<2.0	2.9	140	<1.0	<1.0	35	8.0	24	5.4	<0.10	<1.0	40	<1.0	<1.0	<1.0	34	50
B3A-S-2-2[1]	<2.0	2.9	180	<1.0	<1.0	36	8.6	25	5.8	<0.10	<1.0	40	<1.0	<1.0	<1.0	33	49
B3A-S-5-1	<2.0	1.9	43	<1.0	<1.0	24	7.3	14	5.0	<0.10	<1.0	24	<1.0	<1.0	<1.0	19	29
B3A-S-13-1	<2.0	1.6	54	<1.0	<1.0	25	6.5	13	4.0	<0.10	<1.0	36	<1.0	<1.0	<1.0	19	37
B5A-S-2-1	<2.0	5.2	160	<1.0	<1.0	33	11	28	95	0.41	<1.0	41	<1.0	<1.0	<1.0	30	69
B5A-S-5-1	<2.0	1.3	76	<1.0	<1.0	21	6.5	44	13	<0.10	<1.0	17	<1.0	<1.0	<1.0	14	51
B5A-S-14-1	<2.0	2.5	45	<1.0	<1.0	23	6.1	12	4.8	<0.10	<1.0	24	<1.0	<1.0	<1.0	18	29
B5B-S-2-1	<2.0	4.3	200	<1.0	<1.0	35	16	21	7.4	0.10	<1.0	54	<1.0	<1.0	<1.0	34	49
B51B-S-2-1[2]	<2.0	3.4	120	<1.0	<1.0	29	8.5	19	5.8	<0.10	<1.0	42	<1.0	<1.0	<1.0	27	41
B5B-S-5-1	<2.0	<1.0	41	<1.0	<1.0	17	3.1	12	4.1	<0.10	<1.0	14	<1.0	<1.0	<1.0	9.3	19
B5B-S-13-1	<2.0	5.6	47	<1.0	<1.0	19	5.8	17	4.1	<0.10	<1.0	29	<1.0	<1.0	<1.0	28	34
B5C-S-2-1[3]	<2.0	3.2	98	<1.0	<1.0	34	9.0	22	7.4	<0.10	<1.0	45	<1.0	<1.0	<1.0	32	51
B5C-S-5-1	<2.0	3.0	130	<1.0	<1.0	19	26	11	6.1	<0.10	1.0	36	<1.0	<1.0	<1.0	26	19
B5C-S-14-1	<2.0	5.9	80	<1.0	<1.0	40	7.3	19	3.6	<0.10	<1.0	40	<1.0	<1.0	<1.0	45	41
B11-S-2-1	<3.1	3.7	110	0.63	0.29	43	9.6	20	7.6	0.11	1.8	40	0.46	<0.26	<0.26	41	45
B11-S-5-1	<2.9	4.7	170	0.68	<0.24	40	11	15	5.8	0.039	<0.96	39	0.39	<0.24	<0.24	38	33
B11-S-13-1	<2.5	4.4	170	0.45	<0.2	38	6.8	22	4.1	0.073	1.3	46	0.47	<0.2	<0.2	32	46
B18-S-2-1	<2.0	4.3	140	<1.0	<1.0	29	9.8	18	5.5	<0.10	<1.0	28	<1.0	<1.0	<1.0	29	33
B181-S-2-1[4]	<2.0	2.7	130	<1.0	<1.0	36	13	21	12	<0.10	<1.0	31	<1.0	<1.0	<1.0	33	42
B18-S-5-1	<2.0	1.4	39	<1.0	<1.0	22	3.2	9.8	4.6	<0.10	<1.0	19	<1.0	<1.0	<1.0	17	22
B18-S-17-1	<2.0	3.8	180	<1.0	<1.0	31	11	18	5.0	<0.10	1.1	40	<1.0	<1.0	<1.0	30	39

TABLE 4
SOIL SAMPLE LABORATORY ANALYTICAL RESULTS
TITLE 22 METALS

Analyte	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
Sample ID	**Analytical Results (mg/kg)**																
	Former Railroad Spur Area Samples																
B13-S-1-1	<2 1	**5**	**130**	**0.57**	**0.36**	**47**	**8.6**	**430**	**46**	**1**	**2.4**	**36**	**0.61**	<0.18	<0.18	**36**	**260**
B13-S-2-1	**3.8**	**13**	**410**	**0.64**	**0.97**	**62**	**11**	**2600**	**200**	**0.12**	**4.9**	**45**	**0.86**	<0.28	<0.28	**38**	**1,400**
B13A-S-1-1	**26**	**1.2**	**500**	<1.0	**11**	**1,000**	**27**	**7500**	**1,100**	**0.14**	**52**	**93**	<1 0	<1.0	<1.0	**35**	**5,200**
B13A-S-2-1	<2.0	**1.4**	**98**	<1.0	<1.0	**18**	**5.1**	**43**	**9.5**	**0.30**	<1 0	**18**	<1 0	<1.0	<1.0	**11**	**35**
B13A-S-3-1	**3.4**	**2.5**	**150**	<1.0	**1.2**	**110**	**11**	**200**	**58**	<0.10	**2.6**	**64**	<1.0	<1.0	<1 0	**22**	**330**
B13A-S-4-1	<2 0	**2.0**	**110**	<1.0	<1 0	**27**	**6.7**	**17**	**5.9**	<0.10	<1.0	**28**	<1.0	<1.0	<1 0	**19**	**25**
B14-S-1-1	<2.5	**4.3**	**93**	**0.35**	**1.1**	**190**	**9.7**	**120**	**300**	**0.44**	**2.8**	**35**	<0.21	<0 21	<0.21	**33**	**690**
B14-S-2-1	<2 3	**15**	**97**	**0.51**	**0.46**	**74**	**19**	**92**	**100**	**0.24**	**6.3**	**74**	**0.34**	<0 19	**0.25**	**39**	**170**
B15-S-1-1	**9.3**	**19**	**380**	**0.37**	**2.9**	**2,400**	**25**	**1,800**	**580**	**1.9**	**77**	**670**	**20**	**0.25**	<0.21	**40**	**2,500**
B15-S-2-1	<84	**220**	**7,300**	**22**	<7	**1,800**	**340**	**1,400**	**560**	**0.081**	**58**	**1400**	<7	<7	<7	**1,400**	**2,600**
B15-S-3-1	<2.7	**6.5**	**140**	**0.66**	<0.22	**43**	**12**	**15**	**7.7**	**0.034**	<0.88	**33**	<0 22	<0.22	**0.39**	**43**	**35**
B16-S-1-1	<2 8	**13**	**180**	**0.67**	<0.23	**52**	**9.2**	**120**	**39**	**0.21**	**2.1**	**50**	<0.23	0.23	<0 23	**42**	**120**
B16-S-2-1	<2 9	**6.7**	**190**	**0.7**	<0 25	**51**	**9.2**	**62**	**16**	**0.067**	**2.1**	**48**	<0.25	<0.25	<0 25	**42**	**87**
B16-S-3-1	<3.3	**5.2**	**150**	**0.64**	<0.27	**48**	**9.2**	**77**	**12**	**0.043**	<1.1	**39**	<0.27	<0 27	**0.37**	**41**	**55**
B17-S-1-1	<2.4	**5**	**150**	**0.57**	<0.2	**41**	**8.5**	**21**	**28**	**0.074**	**0.8**	**44**	<0 2	<0.2	**0.25**	**40**	**57**
B17-S-2-1	<2.3	**4.2**	**150**	**0.58**	<0.19	**40**	**12**	**36**	**23**	**0.084**	**0.78**	**50**	<0 19	<0.19	**0.27**	**40**	**72**
B17-S-3-1	<3.3	**4**	**35**	**0.26**	<0.27	**40**	**9**	**6.4**	**3.1**	<0.023	**1.1**	**47**	<0.27	<0.27	<0.27	**31**	**32**
ESLs (Table K-1 Carcinogenic)	31	0 39	15,000	150	1 7	280	910	31,000	260	6.7	390	1,500	390	390	6.3	78	23,000
ESLs (Table K-1 Non-Carcinogenic)	--	22	--	--	39	--	1,400	--	--	--	--	--	--	--	--	--	--
ESLs (Table K-2 Carcinogenic)	410	1.6	170,000	1,900	7 4	1,400	1,900	410,000	750	88	5,100	17,000	5,100	5,100	82	1,000	310,000
ESLs (Table K-2 Non-Carcinogenic)	--	260	--	--	510	--	13,000	--	--	--	--	--	--	--	--	--	--
City of Emeryville CGs[5]	--	24	--	--	--	210	--	--	370	--	--	--	--	--	--	--	--

Notes:
Title 22 Metals analyzed using EPA Method 6010B
Mercury analyzed using EPA Method 7471
<n indicates concentration below laboratory detection limit of n
mg/kg = milligrams per kilogram
Bold lettering indicates concentrations greater than laboratory reporting limits
Shaded cells indicate concentrations reported greater than cleanup goals
[1] Laboratory QA/QC sample
[2] Duplicate sample of B5B-S-2-1
[3] Sample used for Level IV data analysis
[4] Duplicate sample of B18-S-2-1
[5] Previous Cleanup goal established for City of Emeryville sites for multi-family residential and park uses
ESL Table K-1 are the current San Francisco Bay RWQCB Environmental Screening Levels - Residential Exposure Scenario - Direct Exposure Soil Screening Levels
ESL Table K-2 are the current San Francisco Bay RWQCB Environmental Screening Levels - Commercial/Industrial Land Worker Exposure Scenario - Direct Exposure Soil Screening Levels
-- = Not Applicable

TABLE 5
SOIL SAMPLE LABORATORY ANALYTICAL RESULTS
POLYNUCLEAR AROMATIC HYDROCARBONS

Sample ID	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo(a)anthracene	Chrysene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Benzo(a)pyrene	Indeno(1,2,3-cd)pyrene	Dibenz(a,h)anthracene	Benzo(g,h,i)perylene
	Analyte															
	Analytical Result (mg/kg)															
	Warehouse Area Samples															
B1-S-2-1	<0.005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0.005
B1-S-5-1	<0 0051	<0 0051	<0 0051	<0 0051	<0 0051	<0 0051	<0 0051	<0 0051	<0 0051	<0 0051	<0.0051	<0 0051	<0 0051	<0 0051	<0 0051	<0 0051
	Former Railroad Spur Area Samples															
B13-S-1-1	<0 25	<0 25	<0 25	<0 25	<0 25	<0 25	<0 25	<0 25	<0 25	<0 25	<0 25	<0 25	**0.09 J**	<0 25	<0 25[1]	**0.059 J**
B13-S-2-1	<0 13	<0 13	<0 13	<0 13	<0 13	<0 13	<0,13	<0 13	<0 13	<0 13	<0 13	<0,13	**0.035 J**	<0 13	<0 13	**0 025 J**
B14-S-1-1	<0 05	<0 05	<0 05	<0 05	**0.055**	**0 21**	**0 11**	**0.071**	**0.047 J**	**0.092**	**0 069**	<0 05	**0.042 J**	**0.072**	**0.025 J**	**0.099**
B14-S-2-1	**0.014**	**0.017**	<0 01	<0 01	**0 043**	**0 057**	**0 042**	**0.019**	**0.015**	**0.019**	**0.01**	<0 01	**0 0067 J**	**0.017**	**0.0067 J**	**0.029**
B15-S-1-1	<0 049	<0 049	<0 049	<0 049	<0 049	<0 049	**0 086**	**0.18**	**0 012**	**0.23**	**0 21**	**0 16**	**0.25**	**0.17**	**0.073**	**0.2**
B15-S-2-1	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	**0.002J**	<0 005	**0 0018J**	**0.0013J**	**0.00098J**	**0.0014J**	**0.0013J**	<0 005	**0.0017J**
B15-S-3-1	<0 0051	<0 0051	<0 0051	<0 0051	<0 0051	<0 0051	<0 0051	<0,0051	<0 0051	<0 0051	<0 0051	<0 0051	<0 0051	<0 0051	<0 0051	<0 0051
B16-S-1-1	**0.0069**	<0 005	<0 005	<0 005	**0.0082**	<0 005	**0.012**	**0.015**	**0.0047J**	**0 017**	**0.0018J**	**0 019**	**0.0068**	**0.0056**	**0 002J**	**0.0082**
B16-S-2-1	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0,005	<0 005	**0.0021J**	**0.0071**	**0.0027J**	<0 005	<0 005	**0.0013J**
B16-S-3-1	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	**0.0015J**	<0 005	**0.0025J**	<0 005	<0 005	**0.00099J**
B17-S-1-1	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	**0 0015J**	<0 005	**0.002J**	<0 005	**0.0023J**	**0.002J**	<0 005	**0.0037J**
B17-S-2-1	<0 0051	<0 0051	<0 0051	<0 0051	<0 0051	<0 0051	<0 0051	<0 0051	**0.0015J**	<0 0051	**0.0017J**	<0 0051	**0.0022J**	**0 0019J**	<0 0051	**0.0031J**
B17-S-3-1	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	<0 005	**0.0019J**	<0 005	**0.0014**	<0 005	**0.00085J**	<0 005	<0 005	<0,005	**0.0016J**
ESLs (Table G Drinking)	3 4	13	16	8 9	11	2 8	60	85	12	23	46	2 7	130	13	9 9	27
ESLs (Table G Non-Drinking)	4 8	13	19	8 9	11	2 8	60	85	12	23	46	37	130	13	140	27
ESLs (Table K-1 carcinogenic)	1 3	--	--	--	--	--	--	--	0 38	62	0 38	0 38	0 038	0 62	0 062	--
ESLs (Table K-1 non-carcinogenic)	--	1,700	2,500	1,900	1,700	16,000	2,300	3,400	--	--	--	--	--	--	--	17,000
ESLs (Table K-2 carcinogenic)	2 8	--	--	--	--	--	--	--	1 3	210	1 3	1.3	0 13	2 1	0 21	--
ESLs (Table K-2 non-carconogenic)	--	17,000	16,000	14,000	17,000	130,000	22,000	33,000	--	--	--	--	--	--	--	17,000

Notes:
mg/kg = milligrams per kilograms
< = below laboratory reporting limit
J = Laboratory estimate (due to lowered reporting limits)
Bold indicates result above laboratory reporting limit

ESL Table G are the current San Francisco Bay RWQCB Soil Leaching Screening Levels for Drinking and Non-Drinking Water Resources. Note these values were calculated for vadose-zone soil conservatively assumed to be very permeable sand that freely allows the migration of leachate to groundwater. Soil at the former railroad spur area was observed to be fine sandy clay between approximately 1 5 feet and at least 4.5 feet bgs Therefore, this soil type would be a greater inhibiter of the migration of leachate to groundwater than very permeable sand and thus be more protective of groundwater quality.

ESL Table K-1 are the current San Francisco Bay RWQCB Residential Exposure Scenario - Direct Exposure Soil Screening Levels for carcinogenic and non-carcinogenic compounds

ESL Table K-2 are the current San Francisco Bay RWQCB Commercial/Industrial Worker Exposure Scenario - Direct Exposure Soil Screening Levels for carcinogenic and non-carcinogenic compounds

[1] = ESL below laboratory detection limit for dibenz(a,h)anthracene
Shaded cells indicate concentrations reported greater than CGs
-- = Not Applicable

Ninyo & Moore

TABLE 6
SOIL SAMPLE LABORATORY ANALYTICAL RESULTS
VOLATILE ORGANIC COMPOUNDS

Sample ID	B3A-S-2-1	B3A-S-2-2[1]	B3A-S-5-1	B3A-S-13-1	B5C-S-2-1[2]	B5C-S-5-1	B5C-S-14-1	B18-S-2-1	B181-S-2-1[3]	B18-S-5-1	B18-S-17-1	ESLs (Table G Drinking)	ESLs (Table G Non-Drinking)	ESLs (Table K-1)	ESLs (Table K-2)
Analyte	**Analytical Result (µg/kg)**														
1,1,1,2-Tetrachloroethane	<3.9	<3.9	<3.8	<3.9	<4.5	<3.5	<4.6	<3.9	<4.0	<3.3	<4.0	--	--	--	--
1,1,1-Trichloroethane	<3.9	<4.7	<3.8	<3.9	<4.5	<3.5	<4.6	<3.9	<4.0	<3.3	<4.0	--	--	--	--
1,1,2,2-Tetrachloroethane	<3.9	<4.7	<3.8	<3.9	<4.5	<3.5	<4.6	<3.9	<4.0	<3.3	<4.0	--	--	--	--
1,1,2-Trichloroethane	<3.9	<4.7	<3.8	<3.9	<4.5	<3.5	<4.6	<3.9	<4.0	<3.3	<4.0	--	--	--	--
1,1-Dichloroethane	<3.9	<4.7	<3.8	<3.9	<4.5	<3.5	<4.6	<3.9	<4.0	<3.3	<4.0	--	--	--	--
1,1-Dichloroethene	<3.9	<4.7	<3.8	<3.9	<4.5	<3.5	<4.6	<3.9	<4.0	<3.3	<4.0	--	--	--	--
1,1-Dichloropropene	<3.9	<4.7	<3.8	<3.9	<4.5	<3.5	<4.6	<3.9	<4.0	<3.3	<4.0	--	--	--	--
1,2,3-Trichlorobenzene	<3.9	<4.7	<3.8	<3.9	<4.5	<3.5	<4.6	<3.9	<4.0	<3.3	<4.0	--	--	--	--
1,2,3-Trichloropropane	<3.9	<4.7	<3.8	<3.9	<4.5	<3.5	<4.6	<3.9	<4.0	<3.3	<4.0	--	--	--	--
1,2,4-Trichlorobenzene	<3.9	<4.7	<3.8	<3.9	<4.5	<3.5	<4.6	<3.9	<4.0	<3.3	<4.0	--	--	--	--
1,2,4-Trimethylbenzene	<3.9	<4.7	<3.8	<3.9	<4.5	<3.5	<4.6	<3.9	<4.0	<3.3	<4.0	--	--	--	--
1,2-Dibromo-3-chloropropane	<7.9	<9.4	<7.6	<7.9	<9.0	<7.1	<9.3	<7.9	<8.0	<6.6	<7.9	--	--	--	--
1,2-Dibromoethane	<3.9	<4.7	<3.8	<3.9	<4.5	<3.5	<4.6	<3.9	<4.0	<3.3	<4.0	--	--	--	--
1,2-Dichlorobenzene	<3.9	<4.7	<3.8	<3.9	<4.5	<3.5	<4.6	<3.9	<4.0	<3.3	<4.0	--	--	--	--
1,2-Dichloroethane	<3.9	<4.7	<3.8	<3.9	<4.5	<3.5	<4.6	<3.9	<4.0	<3.3	<4.0	--	--	--	--
1,2-Dichloropropane	<3.9	<4.7	<3.8	<3.9	<4.5	<3.5	<4.6	<3.9	<4.0	<3.3	<4.0	--	--	--	--
1,3,5-Trimethylbenzene	<3.9	<4.7	<3.8	<3.9	<4.5	<3.5	<4.6	<3.9	<4.0	<3.3	<4.0	--	--	--	--
1,3-Dichlorobenzene	<3.9	<4.7	<3.8	<3.9	<4.5	<3.5	<4.6	<3.9	<4.0	<3.3	<4.0	--	--	--	--
1,3-Dichloropropane	<3.9	<4.7	<3.8	<3.9	<4.5	<3.5	<4.6	<3.9	<4.0	<3.3	<4.0	--	--	--	--
1,4-Dichlorobenzene	<3.9	<4.7	<3.8	<3.9	<4.5	<3.5	<4.6	<3.9	<4.0	<3.3	<4.0	--	--	--	--
2,2-Dichloropropane	<3.9	<4.7	<3.8	<3.9	<4.5	<3.5	<4.6	<3.9	<4.0	<3.3	<4.0	--	--	--	--
2-Chlorotoluene	<3.9	<4.7	<3.8	<3.9	<4.5	<3.5	<4.6	<3.9	<4.0	<3.3	<4.0	--	--	--	--
4-Chlorotoluene	<3.9	<4.7	<3.8	<3.9	<4.5	<3.5	<4.6	<3.9	<4.0	<3.3	<4.0	--	--	--	--
4-Isopropyltoluene	<3.9	<4.7	<3.8	<3.9	<4.5	<3.5	<4.6	<3.9	<4.0	<3.3	<4.0	--	--	--	--
Benzene	<3.9	<4.7	<3.8	<3.9	<4.5	<3.5	<4.6	<3.9	<4.0	<3.3	<4.0	--	--	--	--
Bromobenzene	<3.9	<4.7	<3.8	<3.9	<4.5	<3.5	<4.6	<3.9	<4.0	<3.3	<4.0	--	--	--	--
Bromodichloromethane	<3.9	<4.7	<3.8	<3.9	<4.5	<3.5	<4.6	<3.9	<4.0	<3.3	<4.0	--	--	--	--
Bromoform	<3.9	<4.7	<3.8	<3.9	<4.5	<3.5	<4.6	<3.9	<4.0	<3.3	<4.0	--	--	--	--
Bromomethane	<3.9	<4.7	<3.8	<3.9	<4.5	<3.5	<4.6	<3.9	<4.0	<3.3	<4.0	--	--	--	--
Carbon tetrachloride	<3.9	<4.7	<3.8	<3.9	<4.5	<3.5	<4.6	<3.9	<4.0	<3.3	<4.0	--	--	--	--
Chlorobenzene	<3.9	<4.7	<3.8	<3.9	<4.5	<3.5	<4.6	<3.9	<4.0	<3.3	<4.0	--	--	--	--
Chloroethane	<3.9	<4.7	<3.8	<3.9	<4.5	<3.5	<4.6	<3.9	<4.0	<3.3	<4.0	--	--	--	--
Chloroform	<3.9	<4.7	<3.8	<3.9	<4.5	<3.5	<4.6	<3.9	<4.0	<3.3	<4.0	--	--	--	--
Chloromethane	<3.9	<4.7	<3.8	<3.9	<4.5	<3.5	<4.6	<3.9	<4.0	<3.3	<4.0	--	--	--	--
cis-1,2-Dichloroethene	<3.9	<4.7	<3.8	<3.9	<4.5	<3.5	<4.6	<3.9	<4.0	<3.3	<4.0	--	--	--	--
cis-1,3-Dichloropropene	<3.9	<4.7	<3.8	<3.9	<4.5	<3.5	<4.6	<3.9	<4.0	<3.3	<4.0	--	--	--	--
Dibromochloromethane	<3.9	<4.7	<3.8	<3.9	<4.5	<3.5	<4.6	<3.9	<4.0	<3.3	<4.0	--	--	--	--
Dibromomethane	<3.9	<4.7	<3.8	<3.9	<4.5	<3.5	<4.6	<3.9	<4.0	<3.3	<4.0	--	--	--	--
Dichlorodifluoromethane	<3.9	<4.7	<3.8	<3.9	<4.5	<3.5	<4.6	<3.9	<4.0	<3.3	<4.0	--	--	--	--
Ethylbenzene	<3.9	<4.7	<3.8	<3.9	<4.5	<3.5	<4.6	<3.9	<4.0	<3.3	<4.0	--	--	--	--
Hexachlorobutadiene	<3.9	<4.7	<3.8	<3.9	<4.5	<3.5	<4.6	<3.9	<4.0	<3.3	<4.0	--	--	--	--
Isopropylbenzene	<3.9	<4.7	<3.8	<3.9	<4.5	<3.5	<4.6	<3.9	<4.0	<3.3	<4.0	--	--	--	--
m,p-Xylene	<7.9	<9.4	<7.6	<7.9	<9.0	<7.1	<9.3	<7.9	<8.0	<6.6	<7.9	--	--	--	--
Methylene chloride	<3.9	<4.7	<3.8	<3.9	<4.5	<3.5	<4.6	<3.9	<4.0	<3.3	<4.0	--	--	--	--
Methyl Tertiary Butyl Ether (MTBE)	<3.9	<4.7	<3.8	<3.9	<4.5	<3.5	<4.6	<3.9	<4.0	<3.3	<4.0	--	--	--	--
n-Butylbenzene	<3.9	<4.7	<3.8	<3.9	<4.5	<3.5	<4.6	<3.9	<4.0	<3.3	<4.0	--	--	--	--
n-Propylbenzene	<3.9	<4.7	<3.8	<3.9	<4.5	<3.5	<4.6	<3.9	<4.0	<3.3	<4.0	--	--	--	--
Naphthalene	<3.9	<4.7	<3.8	<3.9	<4.5	<3.5	<4.6	<3.9	<4.0	<3.3	<4.0	--	--	--	--
o-Xylene	<3.9	<4.7	<3.8	<3.9	<4.5	<3.5	<4.6	<3.9	<4.0	<3.3	<4.0	--	--	--	--
sec-Butylbenzene	<3.9	<4.7	<3.8	<3.9	<4.5	<3.5	<4.6	<3.9	<4.0	<3.3	<4.0	--	--	--	--
Styrene	<3.9	<4.7	<3.8	<3.9	<4.5	<3.5	<4.6	<3.9	<4.0	<3.3	<4.0	--	--	--	--
tert-Butylbenzene	<3.9	<4.7	<3.8	<3.9	<4.5	<3.5	<4.6	<3.9	<4.0	<3.3	<4.0	--	--	--	--
Tetrachloroethene	<3.9	<4.7	<3.8	<3.9	<4.5	<3.5	<4.6	<3.9	<4.0	<3.3	<4.0	--	--	--	--
Toluene	<3.9	<4.7	<3.8	<3.9	<4.5	<3.5	<4.6	<3.9	<4.0	<3.3	<4.0	--	--	--	--
trans-1,2-Dichloroethene	<3.9	<4.7	<3.8	<3.9	<4.5	<3.5	<4.6	<3.9	<4.0	<3.3	<4.0	--	--	--	--
Trichloroethene	**8.3**	**9.2**	<3.8	<3.9	<4.5	<3.5	<4.6	<3.9	<4.0	<3.3	<4.0	460	33,000	1,900	4,100
Trichlorofluoromethane	<3.9	<4.7	<3.8	<3.9	<4.5	<3.5	<4.6	<3.9	<4.0	<3.3	<4.0	--	--	--	--
Vinyl chloride	<3.9	<4.7	<3.8	<3.9	<4.5	<3.5	<4.6	<3.9	<4.0	<3.3	<4.0	--	--	--	--

Notes:
VOCs analyzed using EPA Method 8260B
<n indicates concentration below laboratory detection limit of n
µg/kg = micrograms per kilogram
Bold lettering indicates concentrations greater than laboratory reporting limits
[1] = Laboratory QA/QC sample
[2] = Sample used for Level IV data analysis
[3] = Duplicate sample of B18-S-2-1
ESL Table G are the current San Francisco Bay RWQCB Soil Leaching Screening Levels for Drinking and Non-Drinking Water Resources Note these values were calculated for vadose-zone soil conservatively assumed to be very permeable sand that freely allows the migration of leachate to groundwater. Soil at the former railroad spur area was observed to be fine sandy clay between approximately 1 5 feet and at least 4 5 feet bgs Therefore, this soil type would be a greater inhibiter of the migration of leachate to groundwater than very permeable sand and thus be more protective of groundwater quality.
ESL Table K-1 are the current San Francisco Bay RWQCB Residential Exposure Scenario - Direct Exposure Soil Screening Levels for carcinogeni and non-carcinogenic compounds
ESL Table K-2 are the current San Francisco Bay RWQCB Commercial/Industrial Worker Exposure Scenario - Direct Exposure Soil Screening Levels for carcinogenic and non-carcinogenic compounds
-- = Not Applicable

TABLE 7
GROUNDWATER SAMPLE LABORATORY ANALYTICAL RESULTS
TOTAL EXTRACTABLE HYDROCARBONS

	Analyte		
	TPHd	TPHmo	TPHhf
Sample ID	Analytical Results (µg/L)		
B1-GW-1	<50	<300	<300
B3A-GW-13-1	**230**	**310**	**260**
B31A-GW-13-1[1]	**190**	**280**	**240**
B5-GW-1	**490 HY**	**400 Y**	**880**
B5C-GW-14-1[2]	**120**	**160**	<200
B5C-GW-14-2[3]	**110**	**150**	<200
B11-GW-1	**430 H**	**360 LY**	**790 Y**
B12-GW-1	**220 HY**	<300	**380**
B18-GW-17-1	**200**	**89**	<200
B21-GW-1[4]	71Y	<300	<300
B31-GW-1[5]	<50	<300	<300
EB-GW-1[5]	<50	<50	<200
EB-GW-2[5]	<50	<50	<200
ESLs (Table I-1, Drinking)	100	100	100
ESLs (Table F-3, Drinking Toxicity)	210	210	210
ESLs (Tables I-1 and I-2, Solubility)	2,500	2,500	2,500
ESLs (Table I-2, Non-Drinking)	5,000	5,000	5,000

Notes:
TPHd = Total Petroleum Hydrocarbons as Diesel analyzed by EPA Method 8015B

TPHmo = Total Petroleum Hydrocarbons as Motor Oil analyzed by EPA Method 8015B
TPHhf = Total Petroleum Hydrocarbons as Hydraulic Fluid analyzed by EPA Method 8015B
<n indicates concentration below laboratory detection limit of n
ESLs Table I-1 are the current San Francisco Bay RWQCB Groundwater Screening Levels, ceiling values (taste and odor threshold), where groundwater is a current or potential source of drinking water
ESLs Table I-2 are the current San Francisco Bay RWQCB Groundwater Screening Levels, ceiling values (nuisance odor threshold), where groundwater is not a current or potential source of drinking water
ESL Table F-3 are the current San Francisco Bay RWQCB Final Groundwater Screening Levels based on drinking water toxicity
µg/L = micrograms per liter
H indicates heavier hydrocarbons contributed to the quantitation

Y indicates the sample exhibits a chromatographic pattern which does not resemble standard

L indicates lighter hydrocarbons contributed to the quantitation
Bold lettering indicates concentrations greater than laboratory reporting limits
Shaded cells indicate concentrations reported greater than ESLs
[1] = Duplicate sample of B3A-GW-13-1
[2] = Sample used for Level IV data analysis, data does not match those of fresh reference fue standard, however the chromatographic peaks may indicate the presence of weathered or mixed hydrocarbons.
[3] = Laboratory QA/QC sample
[4] = Duplicate sample of B1-GW-1
[5] = Equipment blank sample

TABLE 8
GROUNDWATER SAMPLE LABORATORY ANALYTICAL RESULTS
TITLE 22 METALS

Sample I.D.	Analytes																
	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
	Analytical Results (µg/L)																
B1-GW-1	<60	<5	**79**	<2	<5	<10	<20	<10	<3	<0.2	<20	**20**	<5	<5	<5	<10	<20
B5-GW-1	<60	<5	**75**	<2	<5	**19**	<20	<10	<3	<0.2	<20	**20**	<5	<5	<5	**13**	**43**
B11-GW-1	<60	<5	**48**	<2	<5	<10	<20	<10	<3	<0.2	<20	<20	<5	<5	<5	<10	**22**
B12-GW-1	<60	<5	**61**	<2	<5	<10	<20	<10	<3	<0.2	<20	<20	<5	<5	<5	<10	**22**
B21-GW-1[1]	<60	<5	**74**	<2	<5	<10	<20	<10	<3	<0.2	<20	**21**	<5	<5	<5	<10	<20
B31-GW-1[2]	<60	<5	<10	<2	<5	<10	<20	<10	<3	<0.2	<20	<20	<5	<5	<5	<10	<20
ESLs Ceiling[3]	50,000	50,000	50,000	50,000	50,000	50,000	50,000	1,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000
ESLs Toxicity[4]	6	50	1,000	4	5	50	140	1,300	15	2	35	100	50	35	2	15	5,000

Notes:
Title 22 Metals analyzed using EPA Method 6010B
Mercury analyzed using EPA Method 7471
µg/L = micrograms per liter
< = below laboratory reporting limits
[1] = Duplicate sample of B1-GW-1
[2] = Equipment Blank Sample
Bold lettering indicates concentrations greater than laboratory reporting limits
Shaded cells indicate concentrations exceeding ESLs

[3] = ESLs Ceiling are the current San Francisco Bay RWQCB Groundwater Screening Levels, ceiling values (odors, etc.), where groundwater is a current or potential source of drinking water (RWQCB 2008 - Table I-1), and where groundwater is not a current or potential source of drinking water (RWQCB 2008 - Table I-2)
[4] = ESLs Toxcity are the current San Francisco Bay RWQCB Final Groundwater Screening Levels based on drinking water toxicity - Table F-3

TABLE 9
GROUNDWATER SAMPLE LABORATORY ANALYTICAL RESULTS
POLYNUCLEAR AROMATIC HYDROCARBONS

Analyte	Sample Identification					
	B1-GW-1	B5-GW-1	B11-GW-1	B12-GW-1	B21-GW-1[2]	B31-GW-1[3]
	Analytical Results (µg/L)					
Naphthalene	<0.09	**0.1**[1]	<0.09	<0.09	<0.09	<0.09
Acenaphthylene	<0.09	<0.1	<0.09	<0.09	<0.09	<0.09
Acenaphthene	<0.09	<0.1	<0.09	<0.09	<0.09	<0.09
Fluorene	<0.09	<0.1	<0.09	<0.09	<0.09	<0.09
Phenanthrene	<0.09	<0.1	<0.09	<0.09	<0.09	<0.09
Anthracene	<0.09	<0.1	<0.09	<0.09	<0.09	<0.09
Fluoranthene	<0.09	<0.1	<0.09	<0.09	<0.09	<0.09
Pyrene	<0.09	<0.1	<0.09	<0.09	<0.09	<0.09
Benzo(a)anthracene	<0.09	<0.1	<0.09	<0.09	<0.09	<0.09
Chrysene	<0.09	<0.1	<0.09	<0.09	<0.09	<0.09
Benzo(b)fluoranthene	<0.09	<0.1	<0.09	<0.09	<0.09	<0.09
Benzo(k)fluoranthene	<0.09	<0.1	<0.09	<0.09	<0.09	<0.09
Benzo(a)pyrene	<0.09	<0.1	<0.09	<0.09	<0.09	<0.09
Indeno(1,2,3-cd)pyrene	<0.09	<0.1	<0.09	<0.09	<0.09	<0.09
Dibenz(a,h)anthracene	<0.09	<0.1	<0.09	<0.09	<0.09	<0.09
Benzo(g,h,i)perylene	<0.09	<0.1	<0.09	<0.09	<0.09	<0.09

Notes:
Polynuclear Aromatic Hydrocarbons analyzed using EPA Method 8270C-SIM
µg/L = micrograms per liter
< = below laboratory reporting limit
[1] = High response was observed for naphthalene in the CCV analyzed 1/12/06
[2] Duplicate sample of B1-GW-1
[3] Equipment Blank Sample

TABLE 10
GROUNDWATER SAMPLE LABORATORY ANALYTICAL RESULTS
VOLATILE ORGANIC COMPOUNDS

Analyte	Sample Identification																		ESLs (Table E-1)	ESLs (Table F-3 Drinking)	ESLs (Table F-1a Drinking)
	B1-GW-1	B3A-GW-13-1	B31A-GW-13-1[1]	B5-GW-1	B5C-GW-14-1[2]	B5C-GW-14-2[2]	B11-GW-1	B12-GW-1	B18-GW-17-1	B21-GW-1[4]	B31-GW-1[5]	EB-GW-1	EB-GW-2	TB-1	TB-1	TB-1	TB-GW-1	TB-GW-2			
	Analytical Results (µg/L)																				
1,1,1,2-Tetrachloroethane	<0.5	<0.50	<0.50	<0.5	<0.50	<0.50	<0.5	<0.5	<0.50	<0.5	<0.5	<0.50	<0.50	<0.50	<0.5	<0.5	<0.50	<0.50	–	–	–
1,1,1-Trichloroethane	<0.5	<0.50	<0.50	<0.5	<0.50	<0.50	<0.5	<0.5	<0.50	<0.5	<0.5	<0.50	<0.50	<0.50	<0.5	<0.5	<0.50	<0.50	–	–	–
1,1,2,2-Tetrachloroethane	<0.5	<0.50	<0.50	<0.5	<0.50	<0.50	<0.5	<0.5	<0.50	<0.5	<0.5	<0.50	<0.50	<0.50	<0.5	<0.5	<0.50	<0.50	–	–	–
1,1,2-Trichloroethane	<0.5	<0.50	<0.50	<0.5	<0.50	<0.50	<0.5	<0.5	<0.50	<0.5	<0.5	<0.50	<0.50	<0.50	<0.5	<0.5	<0.50	<0.50	–	–	–
1,1-Dichloroethane	**0.9**	**0.76**	**0.75**	**0.7**	<0.50	<0.50	<0.5	**1.1**	<0.50	**0.8**	<0.5	<0.50	<0.50	<0.50	<0.5	<0.5	<0.50	<0.50	1,000	5	5
1,1-Dichloroethene	<0.5	<0.50	<0.50	<0.5	<0.50	<0.50	<0.5	<0.5	<0.50	<0.5	<0.5	<0.50	<0.50	<0.50	<0.5	<0.5	<0.50	<0.50	–	–	–
1,1-Dichloropropene	<0.5	<0.50	<0.50	<0.5	<0.50	<0.50	<0.5	<0.5	<0.50	<0.5	<0.5	<0.50	<0.50	<0.50	<0.5	<0.5	<0.50	<0.50	–	–	–
1,2,3-Trichlorobenzene	<0.5	<0.50	<0.50	<0.5	<0.50	<0.50	<0.5	<0.5	<0.50	<0.5	<0.5	<0.50	<0.50	<0.50	<0.5	<0.5	<0.50	<0.50	–	–	–
1,2,3-Trichloropropane	<0.5	<0.50	<0.50	<0.5	<0.50	<0.50	<0.5	<0.5	<0.50	<0.5	<0.5	<0.50	<0.50	<0.50	<0.5	<0.5	<0.50	<0.50	–	–	–
1,2,4-Trichlorobenzene	<0.5	<0.50	<0.50	<0.5	<0.50	<0.50	<0.5	<0.5	<0.50	<0.5	<0.5	<0.50	<0.50	<0.50	<0.5	<0.5	<0.50	<0.50	–	–	–
1,2,4-Trimethylbenzene	<0.5	<0.50	<0.50	<0.5	<0.50	<0.50	<0.5	<0.5	<0.50	<0.5	<0.5	<0.50	<0.50	<0.50	<0.5	<0.5	<0.50	<0.50	–	–	–
1,2-Dibromo-3-chloropropane[4]	<2	<0.50	<0.50	<2	<0.50	<0.50	<2	<2	<0.50	<2	<2	<0.50	<0.50	<0.50	<2	<2	<0.50	<0.50	–	–	–
1,2-Dibromoethane[4]	<0.5	<0.50	<0.50	<0.5	<0.50	<0.50	<0.5	<0.5	<0.50	<0.5	<0.5	<0.50	<0.50	<0.50	<0.5	<0.5	<0.50	<0.50	–	–	–
1,2-Dichlorobenzene	<0.5	<0.50	<0.50	<0.5	<0.50	<0.50	<0.5	<0.5	<0.50	<0.5	<0.5	<0.50	<0.50	<0.50	<0.5	<0.5	<0.50	<0.50	–	–	–
1,2-Dichloroethane	**0.9**	**0.75**	**0.77**	**0.7**	<0.50	<0.50	<0.5	**0.6**	<0.50	**0.8**	<0.5	<0.50	<0.50	<0.50	<0.5	<0.5	<0.50	<0.50	200	0.5	0.5
1,2-Dichloropropane	<0.5	<0.50	<0.50	<0.5	<0.50	<0.50	<0.5	<0.5	<0.50	<0.5	<0.5	<0.50	<0.50	<0.50	<0.5	<0.5	<0.50	<0.50	–	–	–
1,3,5-Trimethylbenzene	<0.5	<0.50	<0.50	<0.5	<0.50	<0.50	<0.5	<0.5	<0.50	<0.5	<0.5	<0.50	<0.50	<0.50	<0.5	<0.5	<0.50	<0.50	–	–	–
1,3-Dichlorobenzene	<0.5	<0.50	<0.50	<0.5	<0.50	<0.50	<0.5	<0.5	<0.50	<0.5	<0.5	<0.50	<0.50	<0.50	<0.5	<0.5	<0.50	<0.50	–	–	–
1,3-Dichloropropane	<0.5	<0.50	<0.50	<0.5	<0.50	<0.50	<0.5	<0.5	<0.50	<0.5	<0.5	<0.50	<0.50	<0.50	<0.5	<0.5	<0.50	<0.50	–	–	–
1,4-Dichlorobenzene	<0.5	<0.50	<0.50	<0.5	<0.50	<0.50	<0.5	<0.5	<0.50	<0.5	<0.5	<0.50	<0.50	<0.50	<0.5	<0.5	<0.50	<0.50	–	–	–
2,2-Dichloropropane	<0.5	<0.50	<0.50	<0.5	<0.50	<0.50	<0.5	<0.5	<0.50	<0.5	<0.5	<0.50	<0.50	<0.50	<0.5	<0.5	<0.50	<0.50	–	–	–
2-Chlorotoluene	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	–	–	–
4-Chlorotoluene	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	–	–	–
4-Isopropyltoluene	NA	<0.50	<0.50	NA	<0.50	<0.50	NA	NA	<0.50	NA	NA	<0.50	<0.50	<0.50	NA	NA	<0.50	<0.50	–	–	–
Benzene	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	–	–	–
Bromobenzene	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	–	–	–
Bromodichloromethane	<0.50	<0.50	<0.50	<0.50	**1.4**	**1.2**	<0.50	<0.50	**0.87**	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	170	100	100
Bromoform	<1.0	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<1.0	<0.50	<1.0	<1.0	<0.50	<0.50	<0.50	<1.0	<1.0	<0.50	<0.50	–	–	–
Bromomethane	<1.0	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<1.0	<0.50	<1.0	<1.0	<0.50	<0.50	<0.50	<1.0	<1.0	<0.50	<0.50	–	–	–
Carbon tetrachloride	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	–	–	–
Chlorobenzene	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	–	–	–
Chloroethane	<1.0	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<1.0	<0.50	<1.0	<1.0	<0.50	<0.50	<0.50	<1.0	<1.0	<0.50	<0.50	–	–	–
Chloroform	<0.50	<0.50	<0.50	<0.50	**15**	**13**	<0.50	<0.50	**8.8**	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	330	70	70
Chloromethane	<1.0	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<1.0	<0.50	<1.0	<1.0	<0.50	<0.50	<0.50	<1.0	<1.0	<0.50	<0.50	–	–	–
cis-1,2-Dichloroethene	**1.8**	**0.88**	**0.84**	**1.7**	<0.50	<0.50	<0.50	<0.50	**0.55**	**1.8**	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	6,200	6	6
cis-1,3-Dichloropropene	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	–	–	–
Dibromochloromethane	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	–	–	–
Dibromomethane	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	–	–	–
Dichlorodifluoromethane	NA	<0.50	<0.50	NA	<0.50	<0.50	NA	NA	<0.50	NA	NA	<0.50	<0.50	<0.50	NA	NA	<0.50	<0.50	–	–	–
Ethylbenzene	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	–	–	–
Hexachlorobutadiene[4]	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	–	–	–
Isopropylbenzene	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	–	–	–
m,p-Xylene	<0.50	<1.0	<1.0	<0.50	<1.0	<1.0	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<1.0	<1.0	<0.50	<0.50	<1.0	<1.0	–	–	–
Methylene chloride	<10	<1.0	<1.0	<10	**1.3**	<1.0	<10	<10	<1.0	<10	<10	<1.0	<1.0	<1.0	<10	<10	<1.0	<1.0	2,400	5	5
MTBE	**1.1**	**0.92**	**0.95**	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	**1**	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	24,000	13	5
n-Butylbenzene	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	–	–	–
n-Propylbenzene	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	–	–	–
Naphthalene	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	–	–	–
o-Xylene	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	–	–	–
sec-Butylbenzene	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	–	–	–
Styrene	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	–	–	–
tert-Butylbenzene	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	–	–	–
Tetrachloroethene	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	–	–	–
Toluene	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	–	–	–
trans-1,2-Dichloroethene	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	–	–	–
Trichloroethene	**11**	**7.8**	**7.8**	**12**	<0.50	<0.50	**0.9**	**8.9**	**2.0**	**12**	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	530	5	5
Trichlorofluoromethane	<1.0	<0.50	<0.50	<1.0	<0.50	<0.50	<1.0	<1.0	<0.50	<1.0	<1.0	<0.50	<0.50	<0.50	<1.0	<1.0	<0.50	<0.50	–	–	–
Vinyl chloride	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	–	–	–

Notes:
VOCs analyzed using EPA Method 8260B
<n indicates concentration below laboratory detection limit of n
µg/L = micrograms per liter
Bold lettering indicates concentrations greater than laboratory reporting limits
ESLs Table E-1 is the current San Francisco Bay RWQCB Groundwater Screening Levels for Evaluation of Potential Vapor Intrusion Concerns - Residential Land Use
ESLs Table F-3 are the current San Francisco Bay RWQCB Final Groundwater Screening Levels based on drinking water toxicity, where groundwater is a current or potential source of drinking water.
ESLs Table F-1a are the current San Francisco Bay RWQCB Final Groundwater Screening Levels, where groundwater is a current or potential source of drinking water, ceiling value for MTBE (odors etc.) and drinking water toxicity for other VOCs
NA = not analyzed for
TB = Trip blank
[1] = Duplicate sample of B3A-GW-13-1
[2] = Sam ple used for Level IV data analysis
[3] = Laboratory QA/QC sample
[4] = Duplicate sample of B1-GW-1
[5] = Equipment blank sample
– = Not Applicable

TABLE 11
SOIL GAS SAMPLE LABORATORY ANALYTICAL RESULTS
VOLATILE ORGANIC COMPOUNDS

	Sample ID												
Analyte	SV1-SV-5-1	SV2-SV-5-1	SV3-SV-5-1	SV31-SV-5-1[1]	SV4-SV-5-1	SV5-SV-6-1	SV5-SV-6-2[2]	SV8-SV-5-1	SV81-SV-5-1[3]	SV9-SV-5-1	SV-AA-1[4]	ESLs, Commercial/ Industrial	ESLs, Residential
	Analytical Results (μg/m³)												
1,1 - Dichloroethene	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	NA	NA
1,1,1,2 - Tetrachloroethane	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	NA	NA
1,1,1-Trichloroethane	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	3.8	<2.7	640,000	230,000
1,1,2,2-Tetrachloroethane	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	NA	NA
1,1,2-Trichloroethane	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	NA	NA
1,1-Dichloroethane	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	NA	NA
1,2,4-Trichlorobenzene	<3.6	<3.6	<3.6	<3.6	<3.6	<3.6	<3.6	<3.6	<3.6	<3.6	<3.6	NA	NA
1,2,4-Trimethylbenzene	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	NA	NA
1,2-Dibromoethane(Ethylene dibromide)	<3.8	<3.8	<3.8	<3.8	<3.8	<3.8	<3.8	<3.8	<3.8	<3.8	<3.8	NA	NA
1,2-Dichlorobenzene	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	NA	NA
1,2-Dichloroethane	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	NA	NA
1,2-Dichloropropane	<2.3	<2.3	<2.3	<2.3	<2.3	<2.3	<2.3	<2.3	<2.3	<2.3	<2.3	NA	NA
1,2-dichlorotetrafluoroethane(F114)	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1	NA	NA
1,3,5-Trimethylbenzene	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	2.9	5.2	2.7	<2.5	—	—
1,3-Butadiene	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	NA	NA
1,3-Dichlorobenzene	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	NA	NA
1,4-Dichlorobenzene	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	NA	NA
1,4-Dioxane	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	NA	NA
2-Butanone (MEK)	42	28	31	29	22	34	27	130	140	72	<1.5	1,500,000	520,000
2-Hexanone	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	19	48	13	<2.0	—	—
4-Ethyl Toluene	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	6.0	8.0	5.9	<2.5	—	—
4-Methyl-2-Pentanone (MIBK)	<2.0	<2.0	3.3	<2.0	<2.0	<2.0	<2.0	28	43	15	<2.0	880,000	310,000
Acetone	230	200	160	190	520	620	800	680	840	180	20	920,000	330,000
Benzene	13	8.3	4.8	4.3	13	11	7.5	8.8	6.9	7.9	2.1	140	42
Benzyl Chloride	<2.9	<2.9	<2.9	<2.9	<2.9	<2.9	<2.9	<2.9	<2.9	<2.9	<2.9	NA	NA
Bromodichloromethane	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	NA	NA
Bromoform	<5.2	<5.2	<5.2	<5.2	<5.2	<5.2	<5.2	<5.2	<5.2	<5.2	<5.2	NA	NA
Bromomethane	<1.9	<1.9	<1.9	<1.9	<1.9	<1.9	<1.9	<1.9	<1.9	<1.9	<1.9	NA	NA
Carbon Disulfide	25	8.8	6.8	11	31	2.7	3.0	2.4	<1.6	4.0	<1.6	—	—
Carbon Tetrachloride	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	NA	NA
Chlorobenzene	<2.3	<2.3	<2.3	<2.3	<2.3	<2.3	<2.3	<2.3	<2.3	<2.3	<2.3	NA	NA
Chloroethane	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	NA	NA
Chloroform	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	7.4	5.6	<2.4	<2.4	770	230
Chloromethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NA	NA
cis-1,2-dichloroethene	21	<2.0	<2.0	<2.0	4.6	<2.0	3.2	<2.0	<2.0	<2.0	<2.0	10,000	3,700
cis-1,3-Dichloropropene	<2.3	<2.3	<2.3	<2.3	<2.3	<2.3	<2.3	<2.3	<2.3	<2.3	<2.3	NA	NA
Dibromochloromethane	<4.3	<4.3	<4.3	<4.3	<4.3	<4.3	<4.3	<4.3	<4.3	<4.3	<4.3	NA	NA
Dichlorodifluoromethane	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	NA	NA
Ethyl Acetate	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	NA	NA
Ethyl Benzene	83	13	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	7.1	6.8	<1.7	1,600	490
Freon 113	<3.8	<3.8	<3.8	<3.8	<3.8	<3.8	<3.8	<3.8	<3.8	<3.8	<3.8	NA	NA
Hexachlorobutadiene	<5.3	<5.3	<5.3	<5.3	<5.3	<5.3	<5.3	<5.3	<5.3	<5.3	<5.3	NA	NA
Hexane	660	240	28	43	<3.5	12	<3.5	8.8	7.2	32	<3.5	—	—
Isopropanol	<16	<16	<16	<16	11500E	120	8,090E	<16	110	48	28	—	—
m,p-Xylene	390	52	15	13	17	22	19	27	31	30	5.7	29,000[5]	10,000
Methylene Chloride	<3.6	<3.6	<3.6	<3.6	<3.6	<3.6	<3.6	<3.6	<3.6	<3.6	26	8,700	2,600
MTBE	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	NA	NA
Naphthalene	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	NA	NA
o-xylene	130	18	4.7	4.1	5.4	7.0	5.8	9.6	11	10	<2.2	29,000[5]	10,000
Styrene	<2.1	<2.1	<2.1	<2.1	<2.1	<2.1	<2.1	<2.1	<2.1	<2.1	4.6	260,000	94,000
Tetrachloroethene	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	NA	NA
Tetrahydrofuran	<1.5	<1.5	<1.5	<1.5	<1.5	2.1	<1.5	<1.5	<1.5	<1.5	<1.5	—	—
Toluene	<1.9	<1.9	12	30	21	23	19	29	23	22	4.8	88,000	31,000
trans-1,2-Dichloroethene	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	NA	NA
Trichloroethene	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	NA	NA
Trichlorofluoromethane	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	NA	NA
Vinyl Acetate	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	NA	NA
Vinyl Chloride	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	NA	NA

Notes:
Soil gas samples analyzed using US EPA Method TO-15
<n indicates concentration below laboratory detection limit of n
μg/m³ = micrograms per cubic meter
ESLs are the current San Francisco Bay RWQCB Shallow Soil Gas Environmental Screening Levels for Evaluation of Potential Vapor Intrusion Concerns using DTSC Attenuation Factors, Residential and Commercial/Industrial Land Use (Table E-4)
1 = Duplicate sample of SV3-SV-5-1
2 = Sample used for laboratory QA/QC sample and Level IV data analysis
3 = Duplicate sample of SV8-SV-5-1
4 = Ambient Air Sample collected on 12/11/2007
5 = Total xylene values used for comparison
E = Estimated concentration This concentration exceeded the laboratory instrument calibration range but was within the linear working range of the instrument.
Bold indicates analysis above laboratory reporting limits
"—" = no published regulatory value
NA = Not applicable because analyte not detected above laboratory

TABLE 12

SOIL SAMPLE LABORATORY ANALYTICAL RESULTS FOR SOLUBLE THRESHOLD LIMIT CONCENTRATIONS AND TOXICITY CHARACTERISTIC LEACHING PROCEDURE AT FORMER RAILROAD SPUR AREA

Sample I.D.	WET (STLC) Leachate (μg/L)						TCLP Leachate (μg/L)	
	Chromium	Copper	Lead	Nickel	Vanadium	Zinc	Chromium	Lead
B13-S-2-1	**1,600**	**190,000**	**12,000**	--	--	--	<100	**140**
B13B-S-2.5	--	--	**235**	--	--	--	--	
B13B-S(0.5-1.5)[1]	--	--	**5,470**	--	--	--	--	**ND**
B14-S-1-1	**5,300**	--	**16,000**	--	--	--	**220**	**110**
B14-S-2-1	**750**	--	**5,200**	--	--	--	<100	**110**
B14A-S(0.5-1.5)[1]	--	--	**6,920**	--	--	--		**70**
B15-S-1-1	**10,000**	**110,000**	**26,000**	**1,800**	--	**160,000**	<100	**64**
B15-S-2-1	<500	**810b**	**630**	**1,100**	**1,100**	--	<100	**69**
B15A-S-1.5	--	--	**9,570**	--	--	--	--	**380**
STLC (μg/L)	**560,000**	**25,000**	**5,000**	**20,000**	**24,000**	**250,000**		
TCLP (μg/L)							**5,000**	**5,000**

Notes:

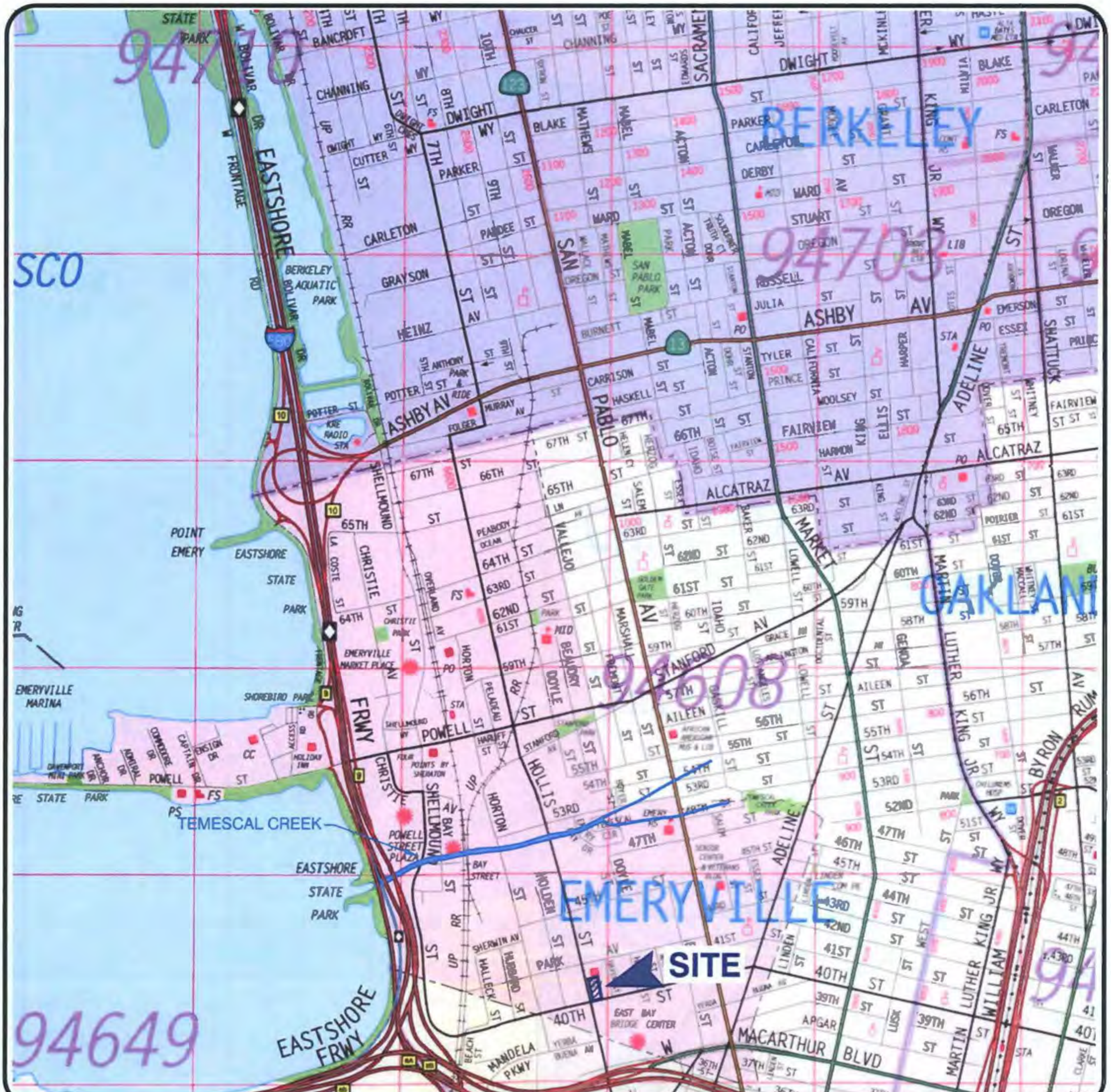
-- Not analyzed

WET and TCLP Leachate analyzed using EPA Method 6010B

<n indicates concentration below laboratory detection limit of n

Bold lettering indicates concentrations greater than laboratory reporting limits

Shaded cells indicate concentrations reported greater than STLCs or TCLPs



REFERENCE: 2004 THOMAS GUIDE FOR SAN FRANCISCO/MARIN/SAN MATETO/SANTA CLARA COUNTIES, STREET GUIDE AND DIRECTORY.

NORTH

0 2400 4800

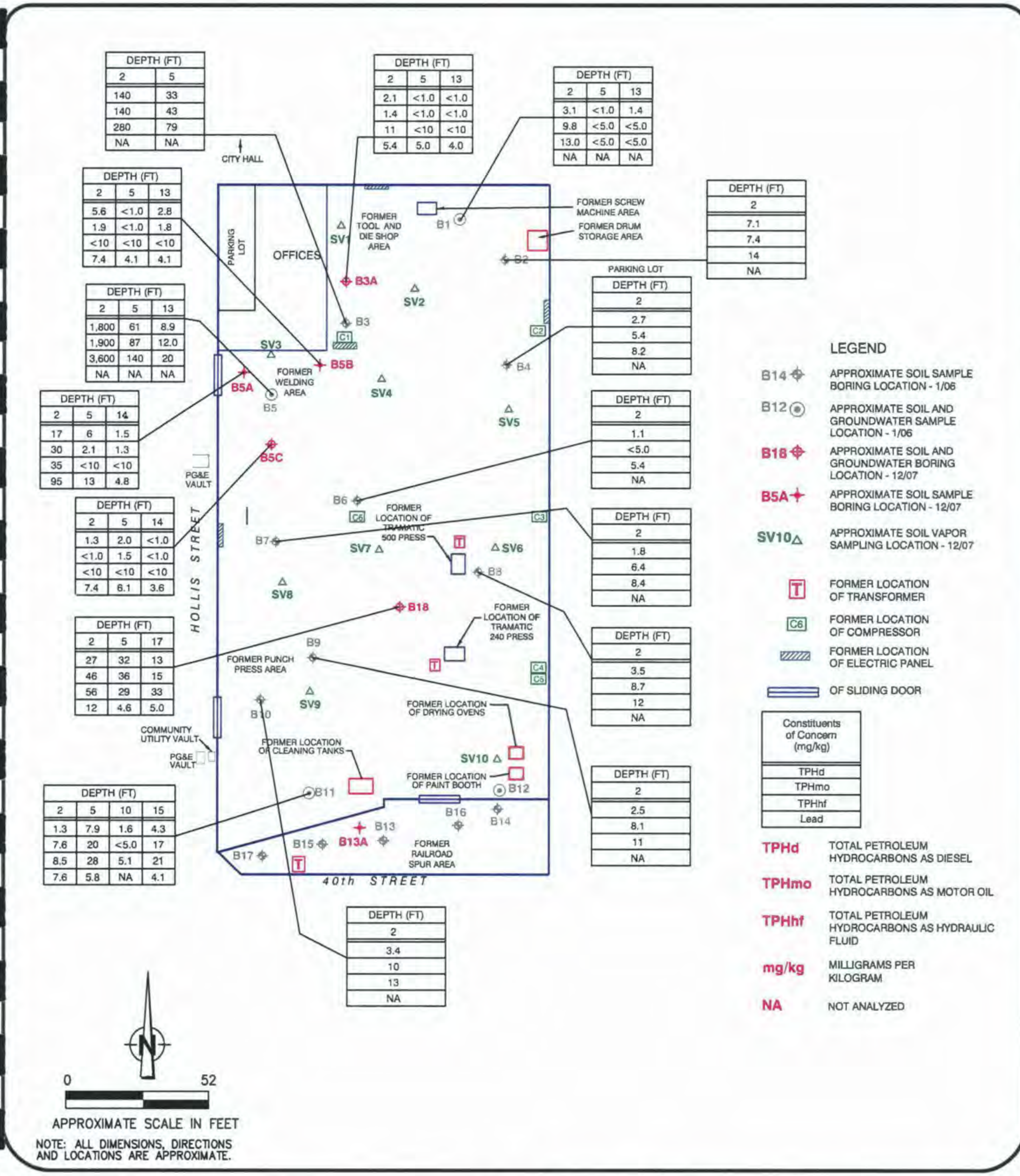
APPROXIMATE SCALE IN FEET

Ninyo & Moore

SITE LOCATION MAP

4060-4062 HOLLIS STREET
EMERYVILLE, CALIFORNIA

PROJECT NO.	DATE	FIGURE
401134004	11/08	1



DEPTH (FT)	
2	5
140	33
140	43
280	79
NA	NA

DEPTH (FT)		
2	5	13
2.1	<1.0	<1.0
1.4	<1.0	<1.0
11	<10	<10
5.4	5.0	4.0

DEPTH (FT)		
2	5	13
3.1	<1.0	1.4
9.8	<5.0	<5.0
13.0	<5.0	<5.0
NA	NA	NA

DEPTH (FT)
2
7.1
7.4
14
NA

DEPTH (FT)		
2	5	13
5.6	<1.0	2.8
1.9	<1.0	1.8
<10	<10	<10
7.4	4.1	4.1

DEPTH (FT)		
2	5	13
1,800	61	8.9
1,900	87	12.0
3,600	140	20
NA	NA	NA

DEPTH (FT)
2
2.7
5.4
8.2
NA

DEPTH (FT)		
2	5	14
17	6	1.5
30	2.1	1.3
35	<10	<10
95	13	4.8

DEPTH (FT)
2
1.1
<5.0
5.4
NA

DEPTH (FT)		
2	5	14
1.3	2.0	<1.0
<1.0	1.5	<1.0
<10	<10	<10
7.4	6.1	3.6

DEPTH (FT)
2
1.8
6.4
8.4
NA

DEPTH (FT)		
2	5	17
27	32	13
46	36	15
56	29	33
12	4.6	5.0

DEPTH (FT)
2
3.5
8.7
12
NA

DEPTH (FT)			
2	5	10	15
1.3	7.9	1.6	4.3
7.6	20	<5.0	17
8.5	28	5.1	21
7.6	5.8	NA	4.1

DEPTH (FT)
2
2.5
8.1
11
NA

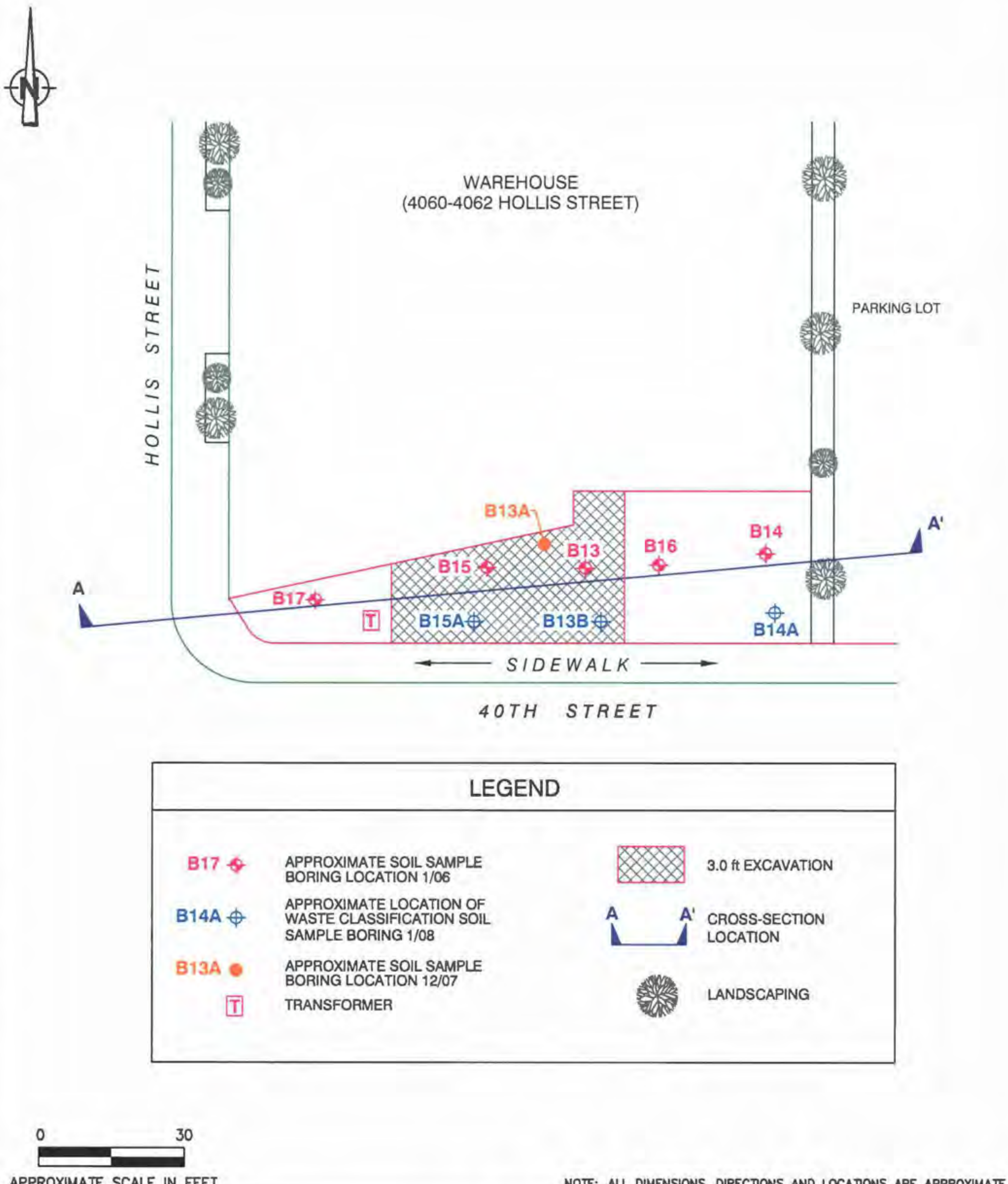
DEPTH (FT)
2
3.4
10
13
NA

Ninyo & Moore

SITE PLAN AND CONCENTRATIONS OF TPHd, TPHmo, TPHhf, AND LEAD IN WAREHOUSE SOIL

4060-4062 HOLLIS STREET
EMERYVILLE, CALIFORNIA

PROJECT NO.	DATE	FIGURE
401134004	11/08	2



NOTE: ALL DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.

Ninyo & Moore

EXCAVATION AREA WITH BORING LOCATIONS AND CROSS-SECTION

4060-4062 HOLLIS STREET
EMERYVILLE, CALIFORNIA

PROJECT NO.	DATE	FIGURE
401134004	11/08	3

B15			
Constituents of Concern (mg/kg)	DEPTH OF SAMPLE - feet bgs		
	1.0	2.0	3 0
TPH-D	500	8.3	<1 0
B(a)P	0 25	0.0014	<0.0051
ARSENIC	19	220	6 5
CADMIUM	2.9	<7 0	<0.22
CHROMIUM	2,400	1,800	43
LEAD	580	560	7.7
VANADIUM	40	1,400	43

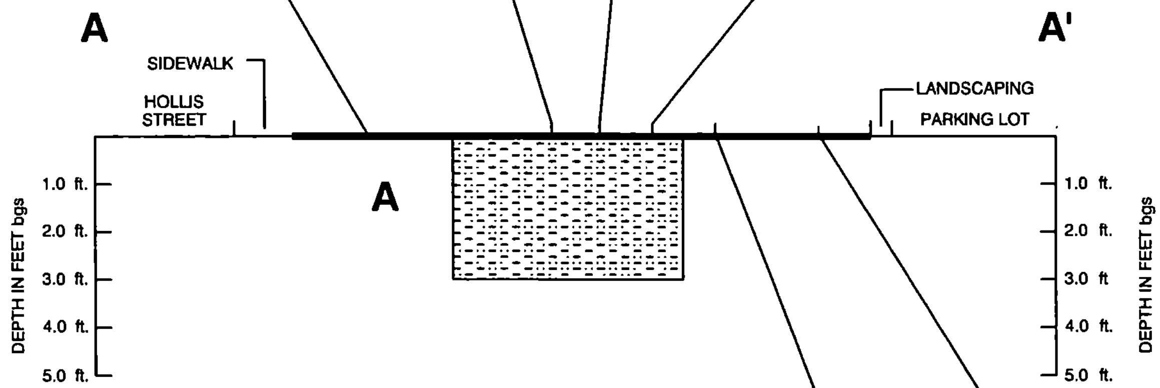
B13A				
Constituents of Concern (mg/kg)	DEPTH OF SAMPLE - feet bgs			
	1.0	2.0	3.0	4 0
TPH-D	58	56	250	5.6
B(a)P	NA	NA	NA	NA
ARSENIC	1.2	1 4	2.5	2 0
CADMIUM	11	<1 0	1.2	<1.0
CHROMIUM	1,000	18	110	27
LEAD	1,100	9.5	58	5 9
VANADIUM	35	11	22	19

B17			
Constituents of Concern (mg/kg)	DEPTH OF SAMPLE - feet bgs		
	1.0	2.0	3.0
TPH-D	2.5	2.8	<1.0
B(a)P	0 0023	0.0022	<0.005
ARSENIC	5	4.2	4
CADMIUM	<0 2	<0 19	<0.27
CHROMIUM	41	40	40
LEAD	28	23	3.1
VANADIUM	40	40	31

B13		
Constituents of Concern (mg/kg)	DEPTH OF SAMPLE - feet bgs	
	1.0	2.0
TPH-D	4,100	3,400
B(a)P	0 09	0.035
ARSENIC	5	13
CADMIUM	0.36	0 97
CHROMIUM	47	62
LEAD	46	200
VANADIUM	36	38

LEGEND

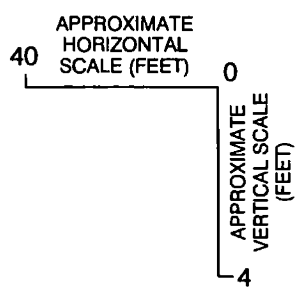
(dotted pattern)	SOIL TO BE EXCAVATED
TPH-D	TOTAL PETROLEUM HYDROCARBONS AS DIESEL
B(a)P	BENZO(a)PYRENE
bgs	BELOW GROUND SURFACE
mg/kg	MILLIGRAMS PER KILOGRAM
NA	NOT ANALYZED



RECOMMENDED CLEAN UP GOALS	
CONSTITUENTS OF CONCERN	ENVIRONMENTAL SCREENING LEVELS
TPH-D	2,200 mg/kg
B(a)P	0.13 mg/kg
ARSENIC	24 mg/kg
CADMIUM	7.4 mg/kg
CHROMIUM	210 mg/kg
LEAD	370 mg/kg
VANADIUM	1000 mg/kg

B16				
Constituents of Concern (mg/kg)	DEPTH OF SAMPLE feet bgs			
	1.0	2.0	3.0	4.0
TPH-D	310	180	160	86
B(a)P	0.0068	0.0027	0.0025	NA
ARSENIC	13	6.7	5.2	NA
CADMIUM	<0.23	<0 25	<0 27	NA
CHROMIUM	52	51	48	NA
LEAD	39	16	12	NA
VANADIUM	42	42	41	NA

B14		
Constituents of Concern (mg/kg)	DEPTH OF SAMPLE - feet bgs	
	1 0	2.0
TPH-D	190	53
B(a)P	0 042	0.0067
ARSENIC	4.3	15
CADMIUM	1.1	0.46
CHROMIUM	190	74
LEAD	300	100
VANADIUM	33	39



NOTE ALL DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE

Ninyo & Moore		CROSS SECTION OF EXCAVATION AREA WITH CONSTITUENTS OF CONCERN	FIGURE
PROJECT NO.	DATE	4060-4062 HOLLIS STREET EMERYVILLE, CALIFORNIA	4
401134004	11/08		

0 35

Approximate Scale:
1 inch = 35 feet

Source: Aerial supplied from Tela Atlas, 2007.

Ninyo & Moore

EXCAVATION AREA PLAN

FIGURE

5

PROJECT NO:
401134004

DATE:
11/08

4060-4062 HOLLIS STREET
EMERYVILLE, CALIFORNIA

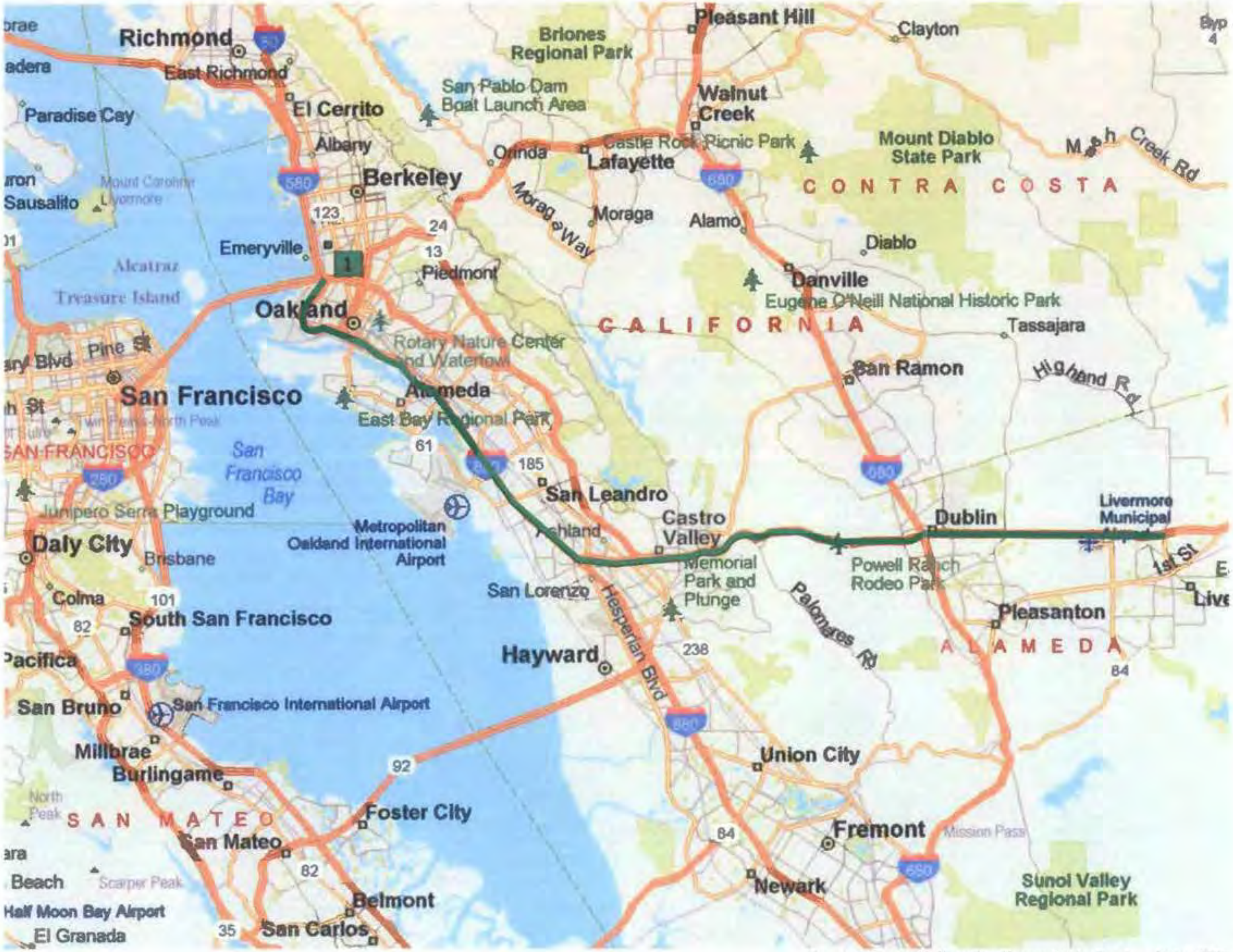
0 1500

Approximate Scale:
1 inch = 1500 feet

Source: Aerial photograph supplied from Digital Globe, 2007.

Ninyo & Moore		PROPOSED TRANSPORTATION ROUTE TO HIGHWAY 880	FIGURE
PROJECT NO: 401134004	DATE: 11/08	4060-4062 HOLLIS STREET EMERYVILLE, CALIFORNIA	6

N



Source: Map supplied from The Thomas Guide, Bay Area Metro, 2007

0 4 miles

Approximate Scale: 1 inch = 4 miles

Ninyo & Moore		PROPOSED TRUCK ROUTE TO KETTLEMAN HILLS LANDFILL-FIRST 35 MILES OF ROUTE	FIGURE
PROJECT NO: 401134004	DATE: 11/08	CITY OF EMERYVILLE REDEVELOPMENT AGENCY 4060-4062 HOLLIS STREET EMERYVILLE, CALIFORNIA	7-1

N

0 30 miles

Approximate Scale: 1 inch = 30 miles

Ninyo & Moore		PROPOSED TRUCK ROUTE TO KETTLEMAN HILLS LANDFILL-FULL ROUTE	FIGURE
PROJECT NO: 401134004	DATE: 11/08	CITY OF EMERYVILLE REDEVELOPMENT AGENCY 4060-4062 HOLLIS STREET EMERYVILLE, CALIFORNIA	7-2

APPENDIX A

CONFIRMATION SAMPLING AND ANALYSIS PLAN

TABLE OF CONTENTS

Tables

Figures

Attachments

1. INTRODUCTION

The City of Emeryville in Alameda County, California, has proposed to redevelop the property at 4060-4062 Hollis Street, in Emeryville. As part of the environmental assessment process, Ninyo & Moore was retained by the Redevelopment Agency of the City of Emeryville to perform a Phase I Environmental Site Assessment (ESA) and two subsurface investigations. These three investigations are discussed in Section 2.8 of the Site Cleanup Plan (SCP). Based on the findings of these investigations, a removal action involving excavating contaminated soil from the southern portion of the site and the collection of post-excavation confirmation samples will be performed.

2. PROJECT DATA QUALITY OBJECTIVES

2.1. PROBLEM DEFINITION AND PROJECT TASKS PURPOSE

Previous subsurface investigations indicated soil in the southern portion of the site was impacted with TEH compounds, benzo(a)pyrene, and metal concentrations above Regional Water Quality Control Board (RWQCB) Environmental Screening Levels (ESLs) at depths to 2 feet below ground surface (bgs). The purpose of this Sampling and Analysis Plan (SAP) is to provide field sampling procedures and data gathering methods to use during confirmation sampling and analysis.

2.2. DATA QUALITY INDICATORS

Ninyo & Moore will utilize and agree to the DQI's defined by the selected private analytical laboratory Advanced Technologies Laboratories (ATL), as provided in the Laboratory Quality Assurance/Quality Control Manual (LQAM) for ATL. ATL is National Environmental Laboratory Accreditation Program (NELAP)-certified. A copy of the LQAM and related documents will be provided upon request.

Sensitivity for the soil analyses are provided in the form of reporting limit tables attached to the LQAM, and Section 5.2.1 to 5.2.2 of the LQAM provides a discussion of the quantitative evaluation of precision and accuracy. Accuracy will be reviewed by comparison with a known concentration, and evaluated by Quality Control (QC) indicators including matrix spikes (MS) and matrix spike duplicates (MSD), surrogate spikes, laboratory control samples (LCS) and laboratory control sample duplicates (LCSD) (blank spikes), and performance samples. Specific LCS/LCSD and MS/MSD recovery ranges and relative percent differences for proposed analyses are also provided in tables following the LQAM. Ninyo & Moore has reviewed the applicable United States Environmental Protection Agency (USEPA) Region 9 DQI tables, and finds that ATL meets the requirements as presented in those tables, with a few exceptions to reporting limits provided in a letter from ATL attached to the LQAM.

USEPA analytical methods will be used with consistent units to provide adequate data comparability.

2.3. DATA REVIEW AND VALIDATION

The equivalent of a Tier 1A data validation will be performed on the data in the form of 90 percent of a Level II data validation, and 10 percent with a more detailed Level IV data validation. Sample data to be analyzed and reviewed using Level IV data validation will be selected from samples located in areas where past data has shown elevated concentrations of constituents of concern.

A Level II data reporting validation would include a review of the data package for completeness, which includes a review of the following: cover letter, laboratory case narrative, chain-of-custody (COC) records, sample results with surrogate recoveries, if applicable, batch QC samples, method blank results, LCS results, and laboratory duplicate results. The Level II QC parameters evaluated would include the following: sample results, preservation, holding times, blanks including field and laboratory, system monitoring compounds (surrogates) – organics only, LCS, MS/MSD, duplicates for field and laboratory, reporting limits, additional lab information/qualifiers, and overall assessment of data. The Level II data validation will be performed by Ninyo & Moore and will not include random checks of raw data.

We propose a Level IV data reporting validation be performed on 10 percent of the data, which will include a review of raw data provided from the privately contracted analytical laboratory. A Level IV data validation will include the above described review of QC parameters and additionally include a review of the following: LCS/LCSD, MS/MSD, calibrations, contract required detection limit standards, interelement check standards, internal standard areas, quantitation sheets, chromatograms, mass spectra, and extraction and analysis logs.

The Level IV data reporting validation will be performed by Veridian Environmental of, Davis, California, in accordance with the USEPA Region 9 memorandum regarding Documentation of Data Validation Requirements, dated January 14, 2000. Depending on the judgment of the professional performing the data validation; data not meeting the DQIs will either be used as an estimate or considered not useable.

2.4. DATA MANAGEMENT

2.4.1. SAMPLE IDENTIFICATION CODES

Samples collected will be labeled in a clear and precise way for identification in the field and for tracking in the laboratory. The samples will have pre-assigned, identifiable, and unique identification codes in alphanumeric sequence that will be used to reference information pertaining to a particular sample. This code will be entered on the sample label, in the field logbook, and on the sample COC form. Each sample label will have an identification code denoting the sample type (confirmation), sampling location number, sample depth (bgs), and sample number. The sample type indicates the sample is a confirmation sample and is designated by "CONF". The following are examples of the sample identification code for the samples to be collected in this project:

- <u>Soil samples:</u> CONF and Location Number – Depth – Sample Number

CONF2-1.5-1: "CONF" denotes a confirmation sample; 2 denotes the location number of the sample; 1.5 denotes the sample depth of 1.5 feet bgs; and 1 denotes the sample is the first sample collected at that depth at that location.

- <u>Lab QC samples:</u> CONF and Location Number – Depth – Sample Number Times 10

CONF1-1.5-10: "CONF" denotes a confirmation sample; 2 denotes the location number of the sample; 1.5 denotes the sample depth of 1.5 feet bgs; and 10 denotes the sample is a lab QC sample from the same location as the first sample collected at that depth at that location.

Duplicate samples (discussed in Section 7.1.2) will be given a unique sample identification code which does not connect it with the primary sample, but will be noted as a duplicate in the field sampling form and the sampler's copy of the COC. The identification of a sample as a duplicate will not be made on the copy of the COC which accompanies the samples to the laboratory.

2.4.2. SAMPLE LABELS

Before sample collection, the sample label will be completed in waterproof ink and secured to the sample container. The sample labels will contain the following information: sample identification code, project location, date of collection, analytical parameter(s), and method of preservation. An example of the sample label is presented in Attachment A.

2.5. ASSESSMENT OVERSIGHT

Before performing work in the field, environmental staff reviews the scope of work, reviews the health and safety plan, coordinates the work to be done with the Project Manager, assembles sample equipment containers, and checks, calibrates and cleans equipment to be used in the field.

The Quality Assurance (QA) Manager will oversee QC activities and document review. Prior to the start of field activities, the Project Manager will hold preparatory meetings with field crew and make sure the appropriate forms, such as COCs (presented in Attachment B), are used during field activities. If field conditions require modifications to protocols outlined in the Sampling Analysis Plan (SAP) or if questions arise, the field crew will contact the Project Manager for direction.

According to the LQAM, ATL participates in several types of internal audits, external audits, and verification practices to assess the quality of the environmental data they produce.

3. CONFIRMATION SAMPLING LOCATIONS AND FREQUENCY

3.1. EXCAVATION OF CONTAMINATED SOIL

Confirmation soil samples will be collected after excavation of contaminated soil to evaluate whether the CGs for the site have been accomplished or if additional excavation is necessary. Post-excavation confirmation sampling will be performed on the floor and sidewalls of the excavated pit to verify if sufficient soil has been removed to meet CGs (Figure A-1). Samples collected on the western portion of the contaminated area during pre-excavation sampling events established that the soil was below CGs at the bottom of the proposed excavation and so post-excavation floor sampling will only be conducted on the eastern portion. Soil samples will be collected in accordance with Section 4 and submitted to the laboratory for analytical testing in accordance with Section 6 of this SAP. If post-excavation soil sample results indicate the presence of COCs with concentrations greater than CGs, then additional excavation will be performed with another round of soil confirmation samples.

3.2. POST-EXCAVATION CONFIRMATION SAMPLING LOCATIONS AND FREQUENCY

The sidewall sampling location and frequency will include a discrete soil sample collected for every 25 linear feet of horizontal sidewall, or portion thereof, and every 3.0 feet of vertical sidewall, or portion thereof. An additional sample will be collected from the floor of the excavation adjacent to boring B13. Soil samples will be collected at a depth of approximately 6 inches to 1 foot into the exposed surface. Each soil sample will be analyzed for the constituents discussed in Section 6 of this SAP.

Additionally, duplicate and laboratory QA/QC samples discussed in Section 7 of this SAP will be collected from random primary sample locations on the sidewalls. Samples will be transported to ATL and analyzed for one or more of the constituents in Table A-1 (Section 6). Table A-2 outlines the sample numbers and the analyses that are to be performed on each sample.

4. FIELD METHODS AND SAMPLING EQUIPMENT

This section describes sampling equipment and procedures associated with post-excavation confirmation sampling, calibration of field equipment, and imported backfill sampling. This section also includes a discussion of decontamination procedures for sampling equipment.

4.1. CONFIRMATION SAMPLING METHODOLOGY

Confirmation soil samples associated with the remedial excavation(s) will be sampled by following the sampling procedures summarized below:

- Obtain an eight-ounce, wide-mouthed jar, and/or a disposable polyethylene scoop. New jars and/or a new scoop will be obtained for each discrete sample collected. The jars are pre-cleaned and will not be rinsed prior to sample collection.
- Don a new, clean, and chemical-resistant pair of disposable gloves.
- Remove approximately two inches of undisturbed soil using the disposable polyethylene scoop prior to collecting the sample.
- Completely fill an eight ounce jar with soil, either by directly coring the jar into the excavation sidewall or floor, or by using the disposable scoop. If the location is not accessible, or is evaluated as unsafe for entry, the samples will be collected from the backhoe or excavator bucket. These soil samples may be collected by directly coring the jar into relatively intact masses of soil in the bucket or by collecting the sample with disposable scoops and transferring the sample into the jar. A minimum of one laboratory-supplied 8-ounce jar of soil will be collected at each sampling location.
- Cap the jars and place a sample label on the jar following the sample labeling protocol described in Section 2.5.2.

Subsequent to collection, soil sample containers will be labeled and placed in zip-lock-type baggies, stored in a cooler with ice and shipped via courier with completed COC documentation to ATL. Samples will be transported to ATL under COC as discussed in Section 5.2.

Soil sample locations will be recorded on field sheets as sampling is conducted. A sketch of the sample location will be entered on the field sheets and any physical reference points will be labeled. If possible, distances to the reference points will be given.

4.1.1. CALIBRATION OF FIELD EQUIPMENT

Field meters will be calibrated according to manufacturer's instructions and guidelines before and after every day of field use. A PID meter will be used for screening of volatile organic compounds (VOCs) in the soil. The PID will be calibrated in order to display concentration in parts per million. First, a supply of zero air, which contains no ionizable gases or vapors, is used to set the zero point. Calibration gas, containing a known concentration of photoionizable gas or vapor, is then used to set the sensitivity. Records of the PID calibrations will be documented in the field logs and users' manual.

4.2. IMPORTED BACKFILL SAMPLING

Soil samples from imported backfill will be collected for analytical testing prior to transportation and delivery on to the site. Soil samples from import backfill will be collected using a hand auger or shovel. The sampling equipment will be decontaminated following procedures outlined in Section 4.3 at the start of sampling and between sampling locations. Stockpile soil samples will be removed from the hand auger and carefully placed in an 8-ounce glass jar. The samples will be placed in a cooler maintained at 4 degrees Celsius with ice. Sample labeling, delivery and COC documentation will be completed per Sections 2.5.2 and 5.2.

Sample number, location, and frequency will follow the Department of Toxic Substances and Control (DTSC) Information Advisory Clean Imported Fill Material document (DTSC, 2001).

4.3. DECONTAMINATION PROCEDURES

Whenever possible, disposable sampling equipment will be used for this project. However, if non-disposable sampling equipment is used, it will be decontaminated to prevent cross-contamination between samples. Sampling equipment will be decontaminated by washing with a non-phosphate detergent such as Liquinox™. Decontamination water will be collected and placed in a 55-gallon drum or wastewater holding tank.

The following steps will be followed for decontamination of non-disposable sampling equipment:

- Wash with a non-phosphate detergent and water solution. This step will remove visible contamination from the equipment. Fill a 5-gallon bucket approximately 3/4 full and add a non-phosphate detergent as directed by the manufacturer. Use a dedicated long-handled brush to assist with cleaning.

- Rinse with potable water. This step will decrease the gross contamination and reduce the frequency of changing of the non-phosphate detergent and water solution. Fill a 5-gallon bucket, 3/4 full with water. Use a dedicated long-handled brush to assist with cleaning of equipment. Frequent changing of this water will increase its effectiveness.

- Rinse with de-ionized water. Fill a 5-gallon bucket approximately 3/4 full of water and use a dedicated long-handled brush to assist with cleaning. Periodic changing of this water is required.

5. SAMPLE DOCUMENTATION AND SHIPMENT

This section will discuss the use of field notes, including the use of daily field reports (DFRs), photographs, COC forms, and packaging and shipping.

5.1. FIELD NOTES

Field notes will be collected on Ninyo & Moore DFRs. Each DFR sheet will have the project number and name, address, and field personnel listed on a daily basis. The DFRs will include a description of the day's events, including the following:

- Sample location and description

- Site or sampling area sketch showing sample location and measured distances

- Sampler's name(s)
- Date and time of sample collection
- Type of sample (soil)
- Type of sampling equipment used
- Field instrument readings and calibrations
- Field observations and details related to analysis or integrity of samples (e.g. weather conditions, wind direction, noticeable odors, colors, etc.)
- Preliminary sample descriptions
- Sample preservation
- Sample identification numbers and COC form numbers
- Shipping arrangements (overnight air bill number)
- Name(s) of recipient laboratory

In addition to the sampling information, the following specific information will also be recorded in the DFRs for each day of sampling:

- Team members and their responsibilities
- Other personnel on site
- Summary of any meetings or discussions with contractor or federal agency personnel
- Deviations from sampling plans, site safety plans, and QA/QC procedures
- Changes in personnel and responsibilities with reasons for the changes
- Levels of safety protection
- Calibration readings for any equipment used and equipment model and serial number

5.1.1. FIELD LOGBOOKS

Field logbooks will not be used during this sampling event. DFRs will be used instead, as discussed in the previous section (Section 5.1).

5.1.2. PHOTOGRAPHS

Photographs will be taken at the sampling locations and at other areas of interest on site. They will serve to support information entered in the daily field sheets. For each photograph taken, the following information will be written in field notes or recorded in a separate field photography log:

- Date, time, location, and weather conditions
- Description of the subject photographed
- Name of person taking the photograph

5.2. SAMPLE CHAIN-OF-CUSTODY FORMS

COC record/traffic report forms will be used to document sample collection and shipment to the laboratory for analysis.

A COC form (included in Attachment B) will be filled out for each sample ice chest shipped to ATL. The COC form will include the laboratory identification number, sample location, sample fraction (abbreviation for sample container type and preservative), parameter list (abbreviation for the list of analyses to be performed), sample matrix type, and site ID. In addition, there are spaces for entry of the sample collection date and time, sample depth, sample collection technique, signature of the persons relinquishing and receiving samples, and the status of samples upon receipt by the analytical laboratory. If multiple coolers are sent to ATL on a single day, COC(s) will be completed and sent with the samples contained in each cooler.

The COC form will also maintain the custodial integrity of the samples. Generally, a sample is considered to be in someone's custody if it is either in someone's physical possession, in someone's view, locked up, or kept in a secured area that is restricted to authorized personnel. Until the samples are shipped, the custody of the samples will be the responsibility of Ninyo & Moore. The sampling team leader or designee will sign the COC form in the "relinquished by" box and note date, time, and air bill number.

The sample numbers for equipment rinsate samples, laboratory QC samples, and duplicate samples will be documented on the COC form. However, field duplicates will be sent blind to the analytical laboratory. A photocopy of the COC form will be made for Ninyo & Moore's master files.

5.3. PACKAGING AND SHIPMENT

Sample containers will be placed in a cooler. The following outlines the packaging procedures that will be followed for low concentration samples.

- The bottom of the cooler should be lined with bubble wrap to prevent breakage during shipment.
- Check screw caps for tightness and, if not full, mark the sample volume level of liquid samples on the outside of the sample bottles with indelible ink.
- Affix sample labels onto the containers with clear tape.
- Wrap glass sample containers in bubble wrap to prevent breakage.
- Seal sample containers in heavy duty plastic zip-lock-type bags. Write the sample numbers on the outside of the plastic bags with indelible ink.
- Place samples in sturdy cooler(s) lined with large plastic trash bags. Coolers will be delivered with COC documentation by Ninyo & Moore personnel.
- Fill empty space in the cooler with bubble wrap or Styrofoam peanuts to prevent movement and breakage during shipment. Vermiculite should also be placed in the coolers if spills should occur.
- Ice used to cool samples will be double sealed in two zip-lock-type plastic bags and placed on top and around the samples to chill them to the correct temperature. Seal the drain plug of the cooler with fiberglass tape to prevent melting ice from leaking out of the cooler.
- Each ice chest will be securely taped shut with fiberglass strapping tape, and custody seals will be affixed to the front, right and back of each cooler.

Records will be maintained by Ninyo & Moore's sample custodian of the following information:

- Sampling contractor's name

- Name and location of the site or sampling area
- Case number
- Total number(s) by estimated concentration and matrix of samples shipped to each laboratory
- Carrier, air bill number (s), method of shipment (priority next day)
- Shipment date and when it should be received by lab
- Irregularities or anticipated problems associated with the samples
- Whether additional samples will be shipped or if this is the last shipment.

6. ANALYTICAL TESTING METHODS

Table A-1 summarizes the analytical test methods for the types of samples to be collected based on regulatory requirements and site recommended cleanup goals. The table also summarizes the sample container, preservation, holding time requirements, and laboratory reporting limits for the samples.

Table A-1 – Analytical Test Methods, Sample Containers, Preservation, Holding Time Requirements, and Laboratory Reporting Limits.

Analytical Parameter	EPA Test Method	Sample Volume and Container Type	Preservation	Holding Time	Laboratory Reporting Limits (mg/kg)
TPH-D	8015M Extended Range C_8 to C_{44}	8 oz BST or GJ, with TLC	Cool 4°C	14 days (Extracted), 40 days (Analysis)	1.0
Metals	6010B	8 oz BST or GJ, with TLC	Cool 4°C	180 days	1.0
PAHs	8270C SIM	8 oz BST or GJ, with TLC	Cool 4°C	14 days (Extracted), 40 days (Analysis)	0.02

NOTES:
BST = Brass or Steel Tube
GJ = Glass Jar
TLC = Teflon™

7. QUALITY CONTROL

7.1. FIELD QUALITY CONTROL SAMPLES

Field quality control samples in the form of duplicate soil samples will be collected on site. Field QC samples will be submitted blind to the analytical laboratories as further discussed in this Section.

7.1.1. ASSESSMENT OF FIELD CONTAMINATION (BLANKS)

A description of field contamination assessment samples for equipment blanks and trip blanks follows.

7.1.1.1. EQUIPMENT BLANKS

Equipment rinsate blanks will be collected to evaluate field sampling and decontamination procedures by pouring deionized water through or over the decontaminated sampling equipment used each day. One equipment rinsate blank will be collected per matrix each day that sampling equipment is decontaminated in the field. Equipment rinsate blanks will be obtained by passing water through or over the decontaminated sampling devices used that day. The rinsate blanks that are collected will be analyzed for TEH compounds using USEPA Method 8015M, PAHs using EPA Method 8270-SIM, and Title 22 Metals using EPA Method 6010B.

The equipment rinsate blanks will be preserved, packaged, and sealed in the manner described for the environmental samples. A separate sample number will be assigned to each sample, and it will be submitted blind to the laboratory.

7.1.2. ASSESSMENT OF FIELD VARIABILITY (FIELD DUPLICATE OR CO-LOCATED SAMPLES)

Field duplicates consist of a sample of the same matrix as the primary sample collected. Duplicate samples will be collected, when necessary, at the same time and location as the primary sample, using the same sampling techniques. The purpose of field duplicate samples is to evaluate the precision of the overall sample collection and analysis process. Field duplicates will be collected at a frequency of one per 20 primary samples and will be analyzed using the same method as the primary sample. Field duplicate sample numbers will be similar to the post-excavation confirmation sample nomenclature; however, minor adjustments in the numbering system will be made to ensure that the identities of the duplicate samples are "blind" to the analytical laboratory. Locations of duplicate samples and their identifications will be recorded in the dedicated field logbook and on the appropriate excavation or stockpile map. Duplicate samples will be preserved, packaged, and sealed in the same manner as other samples of the same matrix.

7.2. LABORATORY QUALITY CONTROL SAMPLES

An additional sample or set of samples will be collected for soil laboratory QC analysis. The sample or samples will be collected in the same way as the original samples and assigned the same sample identification number as the original sample but will be designated as the second sample from this location. These samples will then be compared to the primary field samples to evaluate the laboratory equipment QC.

The laboratory will be alerted as to which sample is to be used for QC analysis by a notation on the sample container label and the COC record. At a minimum, one laboratory QC sample is required per 14 days or one per 20 samples (including blanks or duplicates), whichever is greater. If the sample event lasts longer than 14 days or involves collection of more than 20 samples per matrix, additional QC samples will be designated.

8. FIELD VARIANCES

As conditions in the field may vary, it may be needed to implement minor modifications to sampling as presented in this plan. Sampling locations may be adjusted according to information obtained from underground utility locating conducted prior to sampling or due to accessibility issues. When appropriate, the QA Manager will be notified and a verbal approval will be obtained before implementing the changes. Modifications to the approved plan will be documented in the project report.

9. FIELD HEALTH AND SAFETY PROCEDURES

Ninyo & Moore's site specific Health and Safety Plan is presented in Appendix B.

TABLE A-2
REQUEST FOR ANALYTICAL SERVICES

SPECIFIC ANALYSES REQUESTED				**Organics**		**Inorganics**
				PAHs	TPHd	Title 22 Metals
PRESERVATIVES				Chill to 4°C	Chill to 4°C	Chill to 4°C
ANALYTICAL HOLDING TIME(S)				Hold <14 days prior to extraction, 40 days after extraction	Hold <14 days prior to extraction, 40 days after extraction	Hold <180 days (28 days for mercury)
CONTRACT HOLDING TIMES(S)				Hold <14 days prior to extraction, 40 days after extraction	Hold <14 days prior to extraction, 40 days after extraction	Hold < 45 days (28 days for Hg)
Sample Information				One 8 Ounce Glass Jar per One or More Analysis		
Sample Number	Sample Depth (ft)	Sampling Date	Special Designation	Sample Analyses		
CONF1-1.5-1	1.5			1	0	1
CONF1-1.5-10	1.5		Lab QA/QC	1	0	1
CONF2-1.5-1	1.5			1	0	1
CONF3-1.5-1	1.5			0	1	0
CONF4-1.5-1	1.5			0	1	0
CONF5-1.5-1	1.5			0	1	0
CONF5-1.5-20	1.5		Duplicate	0	1	0
CONF6-3.0-1	3.0			0	1	0

Notes:
TPHd = Total Petroleum Hydrocarbons as Diesel
PAHs = Poly Aromatic Hydrocarbons

NOTE: ALL DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.

Ninyo & Moore

PROPOSED CONFIRMATION SOIL SAMPLE LOCATION MAP

4060-4062 HOLLIS STREET
EMERYVILLE, CALIFORNIA

PROJECT NO.	DATE	FIGURE
401134004	11/08	A-1

ATTACHMENT A

SAMPLE LABELS

ENVIRONMENTAL SAMPLING SUPPLY

LOT#

SAMPLE ID

SAMPLED BY	DATE
	TIME
LOCATION	PRESERVATIVE
ANALYSIS	CLIENT

Oakland, CA • Houston, TX • Chicago, IL • Richmond, VA
(510) 562-4988 www.esavial.com (800) 233-8425

ENVIRONMENTAL SAMPLING SUPPLY

LOT#

SAMPLE ID

SAMPLED BY	DATE
	TIME
LOCATION	PRESERVATIVE
ANALYSIS	CLIENT

Oakland, CA • Houston, TX • Chicago, IL • Richmond, VA
(510) 562-4988 www.esavial.com (800) 233-8425

ENVIRONMENTAL SAMPLING SUPPLY

LOT#

SAMPLE ID

SAMPLED BY	DATE
	TIME
LOCATION	PRESERVATIVI
ANALYSIS	CLIENT

Oakland, CA • Houston, TX • Chicago, IL • Richmo
(510) 562-4988 www.esavial.com (800) 23

ENVIRONMENTAL SAMPLING SUPPLY

LOT#

SAMPLE ID

SAMPLED BY	DATE
	TIME
LOCATION	PRESERVATIVE
ANALYSIS	CLIENT

Oakland, CA • Houston, TX • Chicago, IL • Richmond, VA
(510) 562-4988 www.esavial.com (800) 233-8425

ENVIRONMENTAL SAMPLING SUPPLY

LOT#

SAMPLE ID

SAMPLED BY	DATE
	TIME
LOCATION	PRESERVATIVE
ANALYSIS	CLIENT

Oakland, CA • Houston, TX • Chicago, IL • Richmond, VA
(510) 562-4988 www.esavial.com (800) 233-8425

ENVIRONMENTAL SAMPLING SUPPLY

LOT#

SAMPLE ID

SAMPLED BY	DATE
	TIME
LOCATION	PRESERVATIVE
ANALYSIS	CLIENT

Oakland, CA • Houston, TX • Chicago, IL • Richmo
(510) 562-4988 www.esavial.com (800) 23

ATTACHMENT B

CHAIN-OF-CUSTODY FORMS

CHAIN OF CUSTODY RECORD

Page___ of ___

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
Tel: (562) 989-4045 • Fax: (562) 989-4040

FOR LABORATORY USE ONLY

P.O #: ____________________

Logged By: ______________ Date: ________

Method of Transport
- Client ☐
- ATL ☐
- CA OverN ☐
- FedEx ☐
- Other: ________

Sample Condition Upon Receipt

1. CHILLED	Y ☐	N ☐	4. SEALED	Y ☐	N ☐
2. HEADSPACE (VOA)	Y ☐	N ☐	5. # OF SPLS MATCH COC	Y ☐	N ☐
3. CONTAINER INTACT	Y ☐	N ☐	6. PRESERVED	Y ☐	N ☐

Client: | Address: | Tel:

Attention: | City: | State: | Zip Code: | Fax:

Project Name: | Project #: | Sampler: (Printed Name) | (Signature)

Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:
Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:

I hereby authorize ATL to perform the work indicated below:
Project Mgr /Submitter:

Print Name   Date

Signature

Send Report To:
Attn: ____________
Co: ____________
Addr: ____________
City: State: Zip:

Bill To:
Attn: ____________
Co: ____________
Addr: ____________
City: State: Zip:

Special Instructions/Comments:

Sample/Records - Archival & Disposal
Unless otherwise requested by client, all samples will be disposed 45 days after receipt and records will be disposed 1 year after submittal of final report.

Storage Fees (applies when storage is requested):
- Sample: $2.00 / sample /mo (after 45 days)
- Records: $1 /ATL workorder /mo (after 1 year)

Circle or Add Analysis(es) Requested

SPECIFY APPROPRIATE MATRIX

QA / QC
- RTNE ☐
- CT ☐
- SWRCB ☐ Logcode_____
- OTHER _____

ITEM	LAB USE ONLY: Batch #: Lab No.	Sample Description: Sample ID / Location	Date	Time	8081A (Pesticides)	8082 (PCB)	8260B (Volatiles)	8270C (BNA)	6010B (Total Metal)	8015B (GRO) / 8020 (BTEX)	8015B (DRO)	8021 (BTEX)	TITLE 22 / CAM 17 (6010 / 7000)						SOIL	WATER	GROUND WATER	WASTEWATER			TAT	Container(s) #	Container(s) Type	PRESERVATION	REMARKS

- TAT starts 8AM the following day if samples received after 3 PM

TAT: A = Overnight ≤ 24 hrs | B = Emergency Next Workday | C = Critical 2 Workdays | D = Urgent 3 Workdays | E = Routine 7 Workdays

Container Types: T=Tube V=VOA L=Liter P=Pint J=Jar B=Tedlar G=Glass P=Plastic M=Metal

Preservatives:
H=HCl N=HNO_3 S=H_2SO_4 C=4°C
Z=$Zn(AC)_2$ O=NaOH T=$Na_2S_2O_3$

APPENDIX B

SITE SPECIFIC HEALTH AND SAFETY PLAN

TABLE OF CONTENTS

Tables

1. INTRODUCTION

A soil remediation project is being performed by Ninyo & Moore for the City of Emeryville (City) at the property located at 4060 - 4062 Hollis Street in Emeryville, California (site). The objective of the site remediation is to reduce the risk of exposure from contaminants of concern (COCs) in site soils to levels appropriate for planned future development.

2. PURPOSE OF PLAN

This Health and Safety Plan (HASP) was prepared specifically for Ninyo & Moore personnel during excavation and demolition activities at the site. This HASP describes the work to be performed and addresses health and safety concerns with respect to proposed excavation activities, as well as, personal protection requirements and safe working practices, monitoring and site control procedures, and contingency plans for emergency situations.

A separate HASP will be prepared for site workers by the general contractor, which will be submitted to the City for review prior to the commencement of field activities.

This HASP was prepared for Ninyo & Moore personnel use while performing the following construction related tasks:

- Task 1: Implementing a Storm Water Pollution Prevention Plan (SWPPP).
- Task 2: Overseeing excavation and loading of contaminated on-site soil.
- Task 3: Conducting confirmation soil sampling of excavation areas.
- Task 4: Decontaminating site equipment.
- Task 5: Overseeing site restoration activities including backfilling, compaction, and regrading of site soils, if necessary.

Site remediation activities will include excavation, loading, and transport of COC impacted soils.

3. SITE DESCRIPTION

3.1. General

Site remediation requires the excavation of soils containing levels of constituents exceeding specified site cleanup levels established for site redevelopment, and, upon landfill acceptance, transporting those soils to a permitted landfill for disposal. Primary constituents include total petroleum hydrocarbons as diesel (TPHd), benzo(a)pyrene, and metals (lead, chromium, vanadium, and arsenic). Confirmation sampling will be performed following excavation to evaluate if soil cleanup goals have been achieved.

3.2. Known Contaminants

Contaminants of concern detected during previous site investigations include TPHd, benzo(a)pyrene, lead, chromium, vanadium, and arsenic, and cleanup goals have been recommended for these COCs. Recommended cleanup goals (CGs) for TPHd, benzo(a)pyrene, and vanadium are San Francisco Bay Regional Water Quality Control Board (RWQCB) Shallow Soil Environmental Screening Levels ($\leq$ 3 m below ground surface [bgs]) for Commercial use – direct exposure – where potentially impacted groundwater is not a current or potential drinking water resource (RWQCB 2008). The recommended cleanup goals for TPHd, benzo(a)pyrene, and vanadium are 2,200 milligrams per kilogram (mg/kg), 0.13 mg/kg, and 1,000 mg/kg, respectively.

Recommended lead and arsenic cleanup concentrations were based on CGs established for other City of Emeryville sites to be used for multi-family residential and park uses. The recommended cleanup goals for lead and arsenic are 370 mg/kg and 24 mg/kg, respectively.

The recommended chromium cleanup concentration was based on Environmental Protection Agency Preliminary Remediation Goals, Industrial Soil Supporting Table, Carcinogenic Target List for Chromium VI (EPA 2008). The recommended cleanup goal for chromium is 210 mg/kg.

Groundwater cleanup goals were not developed because COCs were not detected above ESL or maximum contaminant level; groundwater is not a source of drinking water on-site; and groundwater was not encountered within 12.0 feet of the surface during groundwater collection activities. Currently planned remedial activities are not expected to extend to depths where groundwater would be encountered.

4. SCOPE OF WORK

The scope of work will include excavating and removing approximately 250 cubic yards of impacted soil from the vicinity of the former railroad spur on site.

5. ORGANIZATION AND RESPONSIBILITIES

Personnel responsible for fieldwork are identified in Table 1.

Table 1 – Responsible Personnel for the Site

Title	Name	Daytime	After Hours
Project Manager	Blair Bridges	510-633-5640	510-301-9442
Field Team Leader	Blair Bridges	510-633-5640	510-301-9442
Site Health and Safety Officer(SHSO)	Blair Bridges	510-633-5640	510-301-9442
Ninyo & Moore Corporate Safety and Health Manager	Steve Waide	858-576-1000 X1282	(858) 449-8619
Subcontractor	TBD	TBD	TBD
TBD – To be determined			

6. HAZARD ANALYSIS

6.1. Significant Hazards

Significant hazards identified during the job-hazard analysis include noise and hazards associated with heavy equipment/drilling. The following sections provide more information.

6.2. Physical Hazards

The physical hazards associated with Ninyo & Moore projects may include noise; energized and rotating equipment; heavy equipment; steam-cleaning equipment; falling, slipping, and tripping; manual lifting; heat stress; working over or near water; and general physical hazards. These physical hazards are discussed in the following sections.

6.2.1. Noise

Working near heavy equipment or a number of other site activities, can subject workers to noise exposures in excess of allowable limits. Nonessential personnel who do not need to be next to loud equipment should stay as far away as possible to lower the risk of noise-induced hearing loss. Personnel who operate or must work next to heavy equipment will be required to wear hearing protection (ear plugs or muffs) to reduce their exposure to excessive noise. Persons who enter areas in excess of 85 decibels (dB) will be required to wear hearing protection.

Subcontractor personnel will implement equivalent effective hearing conservation programs in accordance with Program requirements.

6.2.2. Energized and Rotating Equipment

In all cases, heavy equipment with rotating shafts or gears will be guarded to prevent accidental contact. Only experienced operators are allowed to work around rotating parts that cannot be adequately guarded. Personnel who must work around rotating equipment will not wear loose-fitting clothes that could get caught. Special precautions should be observed during drilling operations involving casing removal to avoid potential accidents due to equipment failure or breakage.

Site personnel will not operate or handle drilling equipment or heavy equipment owned by subcontractors. The drilling subcontractors will maintain and implement safety procedures according to their safety and health plan. Only qualified subcontractor personnel will operate heavy equipment during field activities. Subcontractors will maintain in operating condition all appropriate safety devices on all machinery and rotating equipment (e.g., backup alarms, emergency stops, guards) at all times. Subcontractors will implement effective safety programs for use of this type of equipment.

6.2.3. Vehicle and Heavy Equipment Operation

Vehicles will only be operated in authorized areas. When moving equipment, caution should be exercised in order not to damage equipment or cause injury. When backing up heavy vehicles (larger than pickup trucks), passenger vehicles, or pickups with obscured rear vision, a guide will be used to direct the vehicle. Extra caution will be exercised during vehicle operation on dike roads, industrial areas, and other close spaces. Personnel directing traffic will wear orange vests. Each vehicle will be equipped with a minimum of one fire extinguisher rated 3A:40B:40C.

6.2.4. Subcontractor-Furnished Equipment

The subcontractor is responsible for proper and safe operation of all the equipment they bring to the site. Program employees will not operate subcontractor-furnished equipment unless that equipment is expressly provided for use of Program personnel. This section does not prohibit use of power from subcontractor-provided generators or the handling of drilling tool components such as samplers.

6.2.5. Falling, Slipping, and Tripping

Work zone surfaces will be maintained in a neat and orderly state. Foot traffic will avoid areas where materials are stored on the ground. Tools and materials will not be left randomly on surfaces where not in direct use. The drilling crew supervisor will assure that the work area around each drilling operation is maintained in a neat and orderly state. Hoses and cables will be grouped, routed to minimize hazards, and covered with a ramp or bridge or clearly marked with hazard tape or flags if such material will remain in place for more than one shift.

6.2.6. Manual Lifting Techniques

During any manual material-handling tasks, personnel will be trained to lift with the force of the load suspended on their legs and not on their backs. An adequate number of personnel or an appropriate mechanical device must be used to safely lift or handle heavy equipment. When heavy objects must be lifted manually, workers will keep the load close to the body and will avoid any twisting or turning motions to minimize stress on the lower back. The Site Health and Safety Officer (SHSO) can provide a lifting orientation and specific back stretching and warm-up exercises to help minimize the potential for back injuries. Use of these exercises by all field personnel at the start of each shift will be encouraged by the SHSO.

6.3. Industrial Hazards

Project activities at field sites may expose personnel to various industrial hazards. Table 2 and the following sections present a summary of the common industrial hazards expected and general methods that will be utilized by the Program to assure worker safety. A task-by-task analysis of industrial hazards for work to be conducted at a site during a specific task will be developed for that work.

The SHSO or designee will observe all operations, particularly heavy equipment operations, to oversee industrial safety hazards such as pinch-points (areas on heavy equipment where limbs or extremities may become caught, mutilated, or dismembered).

To prevent injuries from industrial hazards, engineering controls, administrative procedures (e.g., lockout-tagout procedures), and equipment-guarding techniques will be implemented. In addition, personal protective equipment (PPE) will be used when engineering controls alone cannot reduce the risk of exposure to hazards to acceptable limits.

The overall risks posed by industrial activities associated with cleaning, decontamination, excavation, and vehicle operation are considered greater than the risks posed by potential exposure to chemicals that are the subject of investigation when proper PPE practices are followed; therefore, compliance with safety rules and procedures is of equal or greater importance than compliance with health rules.

6.3.1. Soil Excavation/Trenching

Excavation of contaminated soil presents multiple hazards to workers including chemical exposure, fire and explosion hazards, confined space, and exposure to hazards of contacting unidentified energized utility contact. All work areas will be cleared by the independent utility locators prior to soil-intrusive work or movement of heavy equipment into or through utility corridors, and on-site utilities will be shut off and disconnected prior to demolition and excavation activities. A Competent Person will be on-site during all excavation activities to identify potential safety issues associated with trenching and excavation.

6.3.2. Underground Cables and/or Pipelines

Because buried underground cables and/or pipelines may be present at this site, an underground utility check will be performed before drilling. In addition, where records are inadequate or questionable, a utility search using specialized cable-detection equipment will be performed. Hand boring will be utilized to locate cables when their presence is suspected.

6.3.3. Overhead Electrical Hazards

Overhead cables may be present on sites. A detailed hazard analysis will be prepared by the subcontractor prior to operating heavy equipment (backhoes, excavators) underneath or within 20 feet of the maximum reach of the equipment. The analysis will consider equipment failure of overhead electrical hazards or switch gear.

6.4. Chemical Hazards

This section describes the toxicological (health) hazards associated with exposure to organic and inorganic chemicals and metals during the project. Chemicals which are expected to be encountered are discussed in the following sections.

In dry, arid desert conditions, exposure may occur principally by inhalation of contaminated particulates. Exposure to vapors can occur if trapped volatiles are exposed to the high heat conditions once the material is exposed to the atmosphere.

6.4.1. Petroleum Hydrocarbons

Total petroleum hydrocarbons (TPH) as motor oil and diesel have been identified as two of the constituents of concern at the site and may be encountered in excavated soil. Total petroleum hydrocarbon (TPH) is a term used to describe a large family of several hundred chemical compounds that originally come from crude oil. TPH is a mixture of chemicals, but they are all made mainly from hydrocarbons. Some chemicals that may be found in TPH are hexane, jet fuels, mineral oils, benzene, toluene, xylenes, naphthalene, and fluorene, as well as other petroleum products and gasoline components. Some of the TPH compounds can affect your central nervous system. One compound can cause headaches and dizziness at high levels in the air. Another compound can cause a nerve disorder called "peripheral neuropathy," consisting of numbness in the feet and legs. Other TPH compounds can cause effects on the blood, immune system, lungs, skin, and eyes.

Animal studies have shown effects on the lungs, central nervous system, liver, and kidney from exposure to TPH compounds. Some TPH compounds have also been shown to affect reproduction and the developing fetus in animals. The International Agency for Research on Cancer (IARC) has determined that one TPH compound (benzene) is carcinogenic to humans. IARC has determined that other TPH compounds (benzo[a]pyrene and gasoline) are probably and possibly carcinogenic to humans. Most of the other TPH compounds are considered not to be classifiable by IARC

6.4.2. Benzene

Benzene is a common constituent of motor fuels, aviation gasoline, and some industrial solvents. A known human carcinogen, benzene is the principal concern and the basis for establishing the action levels for continuous monitoring equipment in the vicinity of gasoline and other light distillate products. Continuous organic vapor monitoring will not detect benzene specifically; therefore, the action level is based upon the conservative assumption that the benzene content of the volatile mixture is less than 20 percent. The action level for respiratory protection may be revised once the airborne contaminant environment is fully characterized. The use of benzene-specific detector tubes or portable gas chromatography may be used to quantify benzene concentrations.

In the event that the presence of benzene is confirmed to be above the Occupational Safety and Health Administration (OSHA) action level, guidelines set forth in the OSHA document, Benzene Regulated Areas, will be implemented.

6.4.3. Carcinogens

Carcinogens are any chemicals or products capable of causing or inducing cancer or leukemia in humans. For Program purposes, carcinogens are classified, based upon OSHA, American Conference of Governmental Industrial Hygienists (ACGIH), International Agency for the Research on Cancer (IARC) or National Toxicology Program (NTP) classifications, into recognized or confirmed human carcinogens (Class I), suspect human carcinogens (Class II), questionable carcinogens (Class III), or not recognized as carcinogenic. If recognized or suspect carcinogens (Class I or Class II) have been identified in work areas, they are identified as such in this plan. Exposure by any route to recognized human carcinogens without published exposure limits will be maintained at the absolute practicable minimum level.

6.4.4. Arsenic

Inorganic arsenic may be found in areas where certain industrial residue may have contaminated soils. Arsenic may also be found in areas where arsenic was used as an herbicide. Some arsenic compounds may release a toxic gas when in an acidic environment. Arsenic is a toxic heavy metal. Inorganic arsenic is regulated by OSHA as a carcinogen.

6.4.5. Cadmium

Cadmium is a toxic heavy metal that may be encountered in inorganic or organic forms. Cadmium has been designated a human carcinogen by the IARC.

6.4.6. Chromium

Chromium is a toxic heavy metal. Hexavalent chromium is a known carcinogen. Both may be encountered in inorganic or organic forms.

6.4.7. Lead

Lead has been identified as one of the constituents of concern at the site and may be encountered in excavated soil. Lead may also be encountered as a result of spills or leakage of motor fuels containing lead additives. Lead is a toxic heavy metal and a suspected carcinogen that may be encountered in inorganic or organic forms.

6.4.8. Vanadium

Vanadium may be encountered in inorganic or organic forms.

Where arsenic, chromium, lead, and/or vanadium are identified as present in sufficiently high concentrations, work will be conducted in accordance with the applicable OSHA standards.

6.4.9. Other Heavy Metals

A variety of heavy metals are encountered as contaminants at industrial or military sites. Some heavy metals are highly toxic; others are also recognized human carcinogens. Because these materials are not volatile unless highly heated, control by proper use of PPE and personnel hygiene practices will prevent significant exposure to heavy metals.

7. SITE CONTROL

For intrusive field activities such as excavation operations, precautions shall be taken to assure that only authorized personnel with the proper training and PPE enter work areas associated with the operation of heavy equipment and/or the potential for exposure to hazardous conditions/materials. In these areas, access is controlled with caution tape and/or barricades.

8. DECONTAMINATION

8.1. Personnel Decontamination

A decontamination system will be established at the site location when excavation activities begin. Personnel will be required to brush off boots and wash exposed skin with soap and water before leaving the site.

8.2. Vehicle and Equipment Decontamination

The primary focus of any decontamination program is to minimize the spread of contaminated material beyond a given site. The level of potential contamination for vehicles and equipment at this site is "low" for support vehicles used in uncontaminated areas and/or for non-intrusive field activities, and "medium" for intrusive activities in potentially contaminated sites.

To minimize the potential for contaminated material being released en route, soil will be removed from each vehicle before leaving the exclusion zone. Dry decontamination will be used primarily consisting of brushing tires and siding. If water is used, the wash water will be collected in a lined sump and fluids will be tested and hauled off-site for appropriate disposal or recycling/reuse. If gross removal of contaminants is impractical for some items, these items will be wrapped in plastic prior to transport. A street sweeper may be utilized for the local street route, if needed.

8.3. Testing Requirements Following Decontamination

All items and equipment leaving controlled areas will be inspected by the SHSO for proper decontamination prior to leaving the site. Generally, visual inspection (after dry-wiping) of items used within controlled areas is sufficient to establish adequate decontamination, eliminating the requirement to test for chemical contamination. Subcontractors will notify the SHSO before removing equipment from controlled areas.

9. MEDICAL SURVEILLANCE REQUIREMENTS

All site personnel will be required to participate in their employer's medical surveillance program before being permitted to work on location. The medical surveillance program for Ninyo & Moore employees is described in the Ninyo & Moore Injury and Illness Prevention Program. Teaming partner or subcontractor medical surveillance programs are described in respective company documents. Subcontractors will be required to demonstrate, by document submittal, their maintenance of OSHA-compliant programs and to maintain records as required by the applicable contract. Specific exceptions to the medical surveillance requirements may be granted by the SHSO for site access by specialty subcontractors performing non-intrusive activity.

10. HAZARD MONITORING

During Hollis Street field activities, the following monitoring requirements will be mandated:

Table 2 – Chemical/Physical Agent Monitoring Requirements

Scope of Work Task	Chemical/Hazard	Instrument	Responsible Group	Initial Frequency
Low Hazard				
Surface soil sampling	TPH/Organic vapor	PID/FID	SSHR	Start of task, hourly, continuous if zone of contamination encountered
Decontamination of equipment	TPH/Organic vapor	PID/FID	SSHR	@ SHSO discretion
Moderate hazard				
Excavation	TPH/Organic vapor	PID/FID	SSHR	Start of task, hourly, continuous if zone of contamination encountered

Table 3 – Monitoring Methods and Action Levels for Uncharacterized[1] Mixtures Using Screening Survey Instruments

Hazard	Method	Action Level[2]	Protection Action
Total Organic Vapor	PID[3] or FID[4]	Background to 2 ppm[5] above background	No action required
		> 2 ppm	Air purifying respirator, half or full face, level C protection with appropriate cartridges
		> 5 ppm	Air purifying respirator, full face, Level C protection, personnel monitoring required to I.D. contaminants
		> 10 ppm	Supplied air protection, Level B
		> 50 ppm	STOP WORK
Oxygen Concentration	Oxygen analyzer	< 19.5% v/v[6]	Leave area, evaluate reason for deficiency, monitor again remotely or with IDLH[7] entry program
		19.5 to 20.5 v/v	Slight deficiency, continue continuous monitoring
		20-5 - 21.0% v/v	Normal range
		> 22.0% v/v	Elevated reading, check calibration, investigate cause, STOP any potential spark-producing activity

Notes:
1 Carcinogenic and highly toxic materials not verified absent from atmosphere
2 All action levels are readings observed above background. Verify absence of highly toxic compounds as necessary, e.g. vinyl chloride, methylene chloride, benzene etc.
3 photoionization detector
4 flame ionization detector
5 parts per million
6 volume per volume
7 immediately dangerous to life or health

Table 4 – Monitoring Methods and Action Levels for Petroleum Hydrocarbon Only[1] Sites Using Screening Survey Instruments

Hazard	Method	Action Level[2]	Protection Action
Total Organic Vapor (benzene suspected)	PID[3] or FID[4]	Background to 5 ppm[5] above background	No action required
		> 5 ppm	Air purifying respirator, half or full face, level C protection with organic vapor cartridges
		> 50 ppm	Supplied air protection, Level B
		> 100 ppm	STOP WORK
Total Organic Vapor (benzene absent[6])	PID or FID	Background to 25 ppm above background	No action required
		> 25 ppm	Air purifying respirator, half or full face, level C protection with organic vapor cartridges
		> 200 ppm	Supplied air protection, Level B
		> 500 ppm	STOP WORK

Notes:
1 Action levels based on gasoline, aviation gasoline, and diesel contaminants only. A conservative 20 percent benzene is assumed where benzene is not verified absent from atmosphere. Action levels should be reestablished based on periodic analysis of atmosphere.
2 All action levels are readings observed above background
3 photoionization detector
4 flame ionization detector
5 parts per million
6 Confirm benzene is less than 1 ppm with chromatography or colorimetric indicator tube specific for benzene in the presence of petroleum hydrocarbons (Drager, benzene 0.05, #CH24801 or equivalent)

Table 5 – Action Levels for Heat Stress

Type Measurement	Action Level	Action
Ear insertable core temperature	100.4 degrees F or greater	Remove from work
Ear insertable core temperature	<99 degrees F	Return to work

Table 6 – Frequency of Physiological Monitoring for Fit and Acclimated Workers

Adjusted Temperature[1]	Normal Work Ensemble[2] After Each:	Impermeable Ensemble After Each:
90° F (32.2° C) or above	45 minutes of work	15 minutes of work
86.5° F - 90° F (30.8° C - 32.2° C)	60 minutes of work	30 minutes of work
82.5° F - 86.5° F (28.1° C - 30.8° C)	90 minutes of work	60 minutes of work
76.5° F - 82.5° F (25.3° C - 28.1° C)	120 minutes of work	90 minutes of work
72.5° F - 76.5° F (22.5° C - 25.3° C)	150 minutes of work	120 minutes of work

Notes:

1 Calculate the adjusted air temperature (Ta adj) with the following equation: Ta adj(°F) = Ta(°F) + (13 X %sunshine / 100) Measure air temperature (Ta) with a standard mercury-in-glass thermometer with the bulb shielded from radiant heat. Estimate the percent sunshine by judging what percent time the sun is not covered by clouds that are thick enough to attenuate shadow (100% sunshine = no cloud cover and a sharp, distinct shadow; 0% sunshine = no shadow).

2- A normal work ensemble consists of coveralls or other cotton clothing with long sleeves and pants.

11. PERSONAL PROTECTIVE EQUIPMENT

The following level of PPE will be mandated for the listed tasks:

Table 7 – Personal Protective Equipment (potential or actual chemical exposure)

Task	Hazard	Level	Body	Respirator	Skin	Other
Soil sampling	Minimal chemical exposure	D or Mod. D[a]	Normal work clothes Long pants	Half-face with HEPA[c] and OV[d] ready for use	Latex or nitrile gloves	Hard hat Safety glasses
Decontamination of equipment, controlling spread of contamination	Skin contact	Mod. D	PE[b]-coated Tyvek® suit	Half-face with HEPA[c] and OV[d] ready for use	Latex or nitrile gloves	Hard hat Safety glasses

Notes:

a where the potential for heat stress exists, modified Level D may be downgraded to Level D if continuous monitoring verifies the absence of organic vapor

b PE – polyethylene

c HEPA – high-efficiency particulate air

d OV – organic vapor filter

12. EMPLOYEE TRAINING ASSIGNMENTS

12.1. General Training Requirements

A matrix summarizing training requirements for Ninyo & Moore personnel, subcontract supervisors and personnel, visitors, and vendors is presented in Table 8.

Table 8 – Training Assignment Matrix

Category	40-Hour Basic	8-Hour Refresher	24 Hours Supervised Experience	8-Hour Supervisor Supervisor Refresher[4]	Site-Specific	N&M Safety Orientation	First Aid/CPR	Oxygen Qualified
N&M Employee	X	X	X		X	X	X[1]	X[2]
N&M or Subcontractor Supervisor	X[3]	X[3]	X	X[4]	X[5]	X[5]	X[1]	X[2]
Subcontractor	X[3]	X[3]	X		X[5]	X[5]	X[1]	X[2]
Visitor	X[6]	X[6]	X[7]		X			
Vendor	X[6]	X[6]	X[7]		X			

Notes:
1 At remote locations, (emergency responders more than 10 minutes away) a minimum of two people will be on-site, during fieldwork, who have a valid certificate in basic first aid/CPR from the American Red Cross (or equivalent) documented training.
2 At designated remote sites, a minimum of two people will be qualified to deliver oxygen.
3 The requirement for 40-hour basic and 8-hour refresher training for certain non-intrusive work shall be made on a case-by-case basis by the Corporate Safety Manager.
4 Employees may take supervisor training in lieu of standard refresher training.
5 A site-specific safety orientation must be given to all visiting/working personnel.
6 For vendors/visitors requiring controlled area access to work on contaminated equipment.
7 Not required if escorted.

13. EMERGENCY RESPONSE

13.1. General

In the event of a medical emergency or fire during fieldwork at Hollis Street, the standard "**911**" emergency telephone number shall be called from the on-site mobile phone or any base phone. A mobile telephone will be available during all field activities. On a daily basis, and at each work location, the SHSO and/or field team leader will verify that mobile phones are operational.

Pertinent personnel phone numbers are listed in Section 4. Emergency facility locations and phone numbers are listed below. All project vehicles shall maintain a copy of this section (Section 13) together with the appropriate emergency maps at all times, in a readily accessible location.

The emergency facility located in closest proximity to the site is Alta Bates Summit Medical Center. The hospital address is 350 Hawthorne Avenue, Oakland, California. The route from the Site, to the hospital is shown in Figure A (the last page of this document).

Table 9 – Emergency Phone Numbers
(to be posted by Site Health and Safety Officer at all phone locations)

Emergency	Number	Contact	Notes
Medical, Fire or Police	911	Emergency Operator	
Alta Bates Summit Medical Center	(510) 869-6600 ext 2	Emergency room 350 Hawthorne Avenue Oakland, CA 94609	

14. SPILL PREVENTION AND CONTROL MEASURES

14.1. Preventive Measures

- Inspect all containers upon delivery to the site for visible defects and ensure that each drum or container includes a re-sealable lid.
- Set any 55-gallon drums on wooden pallets to facilitate transport via forklift
- Perform weekly inspections of the storage area.
- Select flat areas for temporary storage away from high-traffic zones and storm or sewer drains.

14.2. Spill Containment Measures

The following actions will be taken by Ninyo & Moore field personnel assigned to the field activities in the event of a spill:

- The Site Coordinator (field team leader) and SHSO are to be notified immediately;

- Workers not involved in spill containment and/or cleanup shall evacuate the immediate area and designated emergency response personnel attired in appropriate PPE (see Section 11), shall proceed to the spill area with a spill cleanup and control kit, including absorbent materials;

- Attempts shall be made to stop the source(s) of spillage immediately;

- The SHSO shall monitor for exposure to chemicals or hazardous substances during spill cleanup work and shall stay at the spill area until the area has been cleared, inspected, and readied for reentry; and

- A spill incident report shall be prepared by the SHSO.

14.3. Record Keeping and Notifications

The SHSO and Field Team Leader shall thoroughly document the spill in an Incident Report which will be forwarded to the Corporate Safety Manager and Project Manager. Records of all hazardous materials releases shall be maintained with the project files and the facility operating record. The Project Manager will make any necessary notifications to off-site authorities and he and the Safety Manager will approve the reentry to the site for routine use and will issue a final release report pertaining to cleanup of the area.

Attachment 1
Health and Safety Plan Acknowledgement Sheet

ONSITE WORKING PERSONNEL SIGN IN

The personnel listed below have 40-hour HAZWOPER training with current refresher status and have read and understood this Health and Safety plan, and agree to abide by its provisions.

Onsite Personnel Name	Signature	Company	Date

FIGURE A

ROUTE TO HOSPITAL

Google

Start 4062 Hollis St
Emeryville, CA 94608
End 350 Hawthorne Ave
Oakland, CA 94609
Travel 1.5 mi – about 8 mins

Get Google Maps on your phone
Text the word "GMAPS" to 466453

4062 Hollis St
Emeryville, CA 94608

Drive: 1.5 mi – about 8 mins

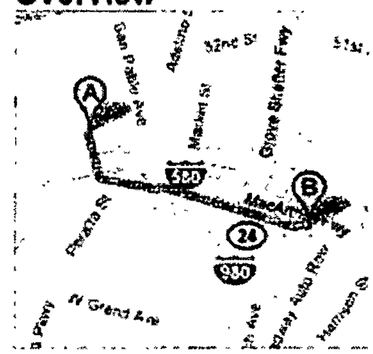
1.	Head **south** on **Hollis St** toward **Yerba Buena Ave**	0.3 mi 1 min
2.	Turn **left** at **34th St**	0.3 mi 2 mins
3.	Turn **left** to stay on **34th St**	125 ft
4.	Turn **right** to stay on **34th St**	0.9 mi 6 mins
5.	Turn **right**	69 ft

350 Hawthorne Ave
Oakland, CA 94609

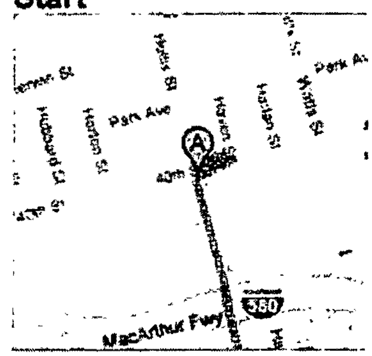
These directions are for planning purposes only. You may find that construction projects, traffic, or other events may cause road conditions to differ from the map results.

Map data ©2008 NAVTEQ™

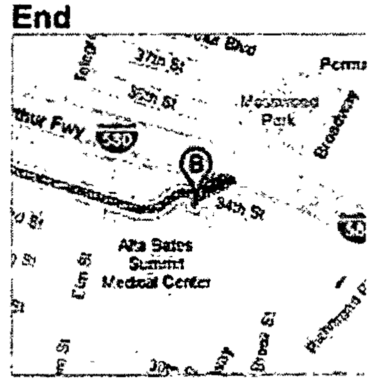
Overview



Start



End



Map data ©2008 NAVTEQ™

APPENDIX C

CALCULATION OF UCLS

Statistical Analysis for Remaining Concentrations of Lead and Benzo(a)pyrene

An analysis of the lead and benzo(a)pyrene data from borings B-13A and B-14 through B-17 was performed for the 95 percent upper confidence limits (UCLs). Statistical analysis was conducted using the ProUCL statistical analysis software recommended by the EPA. ProUCL finds the statistical distribution model that best represents the distribution of a data set. The software then recommends which UCL should be used based on how the data fit this model. If the data do not resemble any of the distribution models, the data can be analyzed using a non-parametric method that does not depend upon the shape of the sample population.

The ProUCL software indicated that the lead data followed a Gamma distribution. Assuming that the data follow the Gamma distribution, the 95% UCL for lead was calculated at 119.3 mg/kg. The ProUCL software indicated that the benzo(a)pyrene data did not follow a distribution model; therefore, a non-parametric method should be used. Using the Standard Bootstrap method that calculates a non-parametric UCL, the 95% UCL for benzo(a)pyrene was calculated at 0.014 mg/kg. Spreadsheets showing the UCL calculations are presented in Tables C-1 and C-2.

Table C-1

Statistical Analysis of Remaining Lead Concentrations for Borings B13A and B14 through B17

Sampl ID	Lead (mg/kg)	Raw Statistics		Normal Distribution Test	
B13A-S-3-1	58	Number of Valid Samples	11.00	Shapiro-Wilk Test Statisitic	0.61
B13A-S-4-1	5.9	Number of Unique Samples	11.00	Shapiro-Wilk 5% Critical Value	0.85
B14-S-1-1	300	Minimum	3.10	Data not normal at 5% significance level	
B14-S-2-1	100	Maximum	300.00		
B15-S-3-1	7.7	Mean	53.88	95% UCL (Assuming Normal Distribution)	
B16-S-1-1	39	Median	23.00	Student's-t UCL	101.13
B16-S-2-1	16	Standard Deviation	86.47		
B16-S-3-1	12	Variance	7476.60	Gamma Distribution Test	
B17-S-1-1	28	Coefficient of Variation	1.60	A-D Test Statistic	0.46
B17-S-2-1	23	Skewness	2.74	A-D 5% Critical Value	0.76
B17-S-3-1	3.1			K-S Test Statistic	0.17
		Gamma Statistics		K-S 5% Critical Value	0.27
		k hat	0.72	Data follow gamma distribution	
		k star (bias corrected)	0.59	at 5% significance level	
		Theta hat	74.49		
		Theta star	91.85	95% UCLs (Assuming Gamma Distribution)	
		nu hat	15.91	Approximate Gamma UCL	119.3083015
		nu star	12.906449	Adjusted Gamma UCL	137.050387
		Approx.Chi Square Value (.05)	5.8287893		
		Adjusted Level of Significance	0.03	Lognormal Distribution Test	
		Adjusted Chi Square Value	5.07	Shapiro-Wilk Test Statisitic	0.99
				Shapiro-Wilk 5% Critical Value	0.85
		Log-transformed Statistics		Data are lognormal at 5% significance level	
		Minimum of log data	1.13		
		Maximum of log data	5.70	95% UCLs (Assuming Lognormal Distribution)	
		Mean of log data	3.16	95% H-UCL	262.41
		Standard Deviation of log data	1.32	95% Chebyshev (MVUE) UCL	142.73
		Variance of log data	1.75	97.5% Chebyshev (MVUE) UCL	182.98
				99% Chebyshev (MVUE) UCL	262.04
				95% Non-parametric UCLs	
		RECOMMENDATION		CLT UCL	96.76
		Data follow gamma distribution (0.05)		Adj-CLT UCL (Adjusted for skewness)	119.77
				Mod-t UCL (Adjusted for skewness)	104.72
		Use Approximate Gamma UCL		Jackknife UCL	101.13
				Standard Bootstrap UCL	96.00
				Bootstrap-t UCL	227.55
				Hall's Bootstrap UCL	262.54
				Percentile Bootstrap UCL	100.59
				BCA Bootstrap UCL	127.33
				95% Chebyshev (Mean, Sd) UCL	167.52
				97.5% Chebyshev (Mean, Sd) UCL	216.69
				99% Chebyshev (Mean, Sd) UCL	313.28

Notes:
mg/kg = milligrams per kilogram

Table C-2

Statistical Analysis of Remaining Benzo(a)pyrene Concentrations for Borings B14 through B17

Sampl ID	B(a)P (ug/kg)	Raw Statistics		Normal Distribution Test	
B14-S-1-1	42	Number of Valid Samples	9.00	Shapiro-Wilk Test Statisitic	0.49
B14-S-2-1	6.7	Number of Unique Samples	8.00	Shapiro-Wilk 5% Critical Value	0.83
B15-S-3-1	2.55*	Minimum	2.20	Data not normal at 5% significance level	
B16-S-1-1	6.8	Maximum	42.00		
B16-S-2-1	2.7	Mean	7.81	95% UCL (Assuming Normal Distribution)	
B16-S-3-1	2.5	Median	2.55	Student's-t UCL	15.84
B17-S-1-1	2.3	Standard Deviation	12.96		
B17-S-2-1	2.2	Variance	167.90	Gamma Distribution Test	
B17-S-3-1	2.5*	Coefficient of Variation	1.66	A-D Test Statistic	1.59
		Skewness	2.89	A-D 5% Critical Value	0.75
				K-S Test Statistic	0.36
		Gamma Statistics		K-S 5% Critical Value	0.29
		k hat	0.94	Data do not follow gamma distribution	
		k star (bias corrected)	0.70	at 5% significance level	
		Theta hat	8.29		
		Theta star	11.12	95% UCLs (Assuming Gamma Distribution)	
		nu hat	16.96	Approximate Gamma UCL	17.461913
		nu star	12.638647	Adjusted Gamma UCL	20.98069
		Approx.Chi Square Value (.05)	5.6495336		
		Adjusted Level of Significance	0.02	Lognormal Distribution Test	
		Adjusted Chi Square Value	4.70	Shapiro-Wilk Test Statisitic	0.70
				Shapiro-Wilk 5% Critical Value	0.83
		Log-transformed Statistics		Data not lognormal at 5% significance level	
		Minimum of log data	0.79		
		Maximum of log data	3.74	95% UCLs (Assuming Lognormal Distribution)	
		Mean of log data	1.44	95% H-UCL	20.38
		Standard Deviation of log data	0.97	95% Chebyshev (MVUE) UCL	15.46
		Variance of log data	0.94	97.5% Chebyshev (MVUE) UCL	19.43
				99% Chebyshev (MVUE) UCL	27.23
				95% Non-parametric UCLs	
				CLT UCL	14.91
				Adj-CLT UCL (Adjusted for skewness)	19.35
		RECOMMENDATION		Mod-t UCL (Adjusted for skewness)	16.53
		Data are Non-parametric (0.05)		Jackknife UCL	15.84
				Standard Bootstrap UCL	14.37
				Bootstrap-t UCL	52.16
				Hall's Bootstrap UCL	52.69
				Percentile Bootstrap UCL	16.08
				BCA Bootstrap UCL	20.46
				95% Chebyshev (Mean, Sd) UCL	26.63
				97.5% Chebyshev (Mean, Sd) UCL	34.78
				99% Chebyshev (Mean, Sd) UCL	50.78

Notes:

* indicates concentration below the detection limit, therefore a value of one half the detection limit was used

B(a)P = benzo(a)pyrene

ug/kg = micrograms per kilogram